* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1]A socket suitable for inserting into an administration set containing a fluid lead pipe which fits connection to a medical-application liquid source and a patient is used, (a) An entrance which is suitable for connection to an upstream section of a fluid lead pipe, an exit which is suitable for connection to a downstream part of (b) fluid lead pipe, (c) A fluid acceptance segment with a downstream end in said entrance, an upstream end in fluid communicating and said exit, and fluid communicating, (d) a part with which it can run through, and (e) -- said socket provided with a means for permitting fluid communicating between this cannula and said socket exit at the same time it isolates cannula which invades into said socket through said part with which it can run through from said fluid acceptance segment.
[Claim 2]A means (e) to isolate cannula which invades into said socket from said liquid acceptance segment, the outside of cannula which is arranged in line about said part with which it can run through downstream from said acceptance segment, and invades into a socket through said part with which it can run through -- liquid -- the socket according to claim 1 which is elasticity bushing which carries out a seal densely.
[Claim 3]A means (e) to isolate cannula which invades into said socket from said liquid acceptance segment, Counter with a part (d) with which Mr. Piston who can do elastic deformation can run through, and a part which may this piston Mr. **** in a liquid acceptance segment, and it is provided, The socket according to claim 1 constituted with an outflow seal which can form a fluid-tight seal in the surroundings of cannula which invaded into a socket by elastic deformation of this part that may piston Mr. ****.
[Claim 4]Said part with which it can run through contains a surrounding ring shape extension of a periphery of a main body portion with which it can run through, and a main body portion, Said ring shape extension has the expanded periphery edge, and said socket corresponds to said ring shape extension containing said periphery of expansion on parenchyma, and the upper part which forms an annular groove which accommodates it, and a lower part fixture are included, Therefore, Claim 1 which prevents removal of said part without said upper part and a lower part fixture catching said part with which it can run through in the meantime, and destroying said socket or a socket given in 2 or 3.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]Concerning discharge to the patient of useful drugs, technical field this invention of this invention is made safe in more detail, and relates to passive discharge of useful ** to a patient's venous system in an effective mode.
[0002]Before the drugs of a majority of background this inventions are administered intravenously to a patient, they are mixed with a diluent. A diluent may have even for example, a glucose solution, a salt solution, or water. Many of such drugs are supplied with a powder form, and are packed in a glass vial or an ampul. Although used for a chemotherapy, other drugs [like] are liquefied and are packed in a glass vial or an ampul.
[0003]A powder agent can be restored in the mode which is used in order to pour in into a vial for an injector's mixing of liquid, and inhales from a vial the solution mixed eventually and which could use the injector and was known. When drugs must be diluted before discharge to a patient, these drugs are often poured in to the back diluent container with which it was restored, and this container can be then connected to the administration set for discharge to a patient. further -- detailed -- a diluent -- a glass bottle or TORABE Norian of the Illinois DIYA field, lab RATORIZU, and yne condominium lei TEDDO -- a mini bag and Bahia -- flex time -- it is often packed in a flexible plastic bag which is sold by the name. These containers have an administration port for connecting container contents to the administration set emitted to a patient from a container. Drugs are typically added through the injection site on a container.
[0004]Drugs are packed independently [a diluent] for various Reasons. When one of the most important Reasons mixes much drugs with a diluent, it is the thing [that chemical and physical stability cannot be maintained and any substantial time periods cannot be stored for the reason]. Since the enterprise which provides the medical liquid included in the container for intravenous discharge of many companies which manufacture drugs is not undertaken, and since [its] it is opposite, drugs are often packed independently [a diluent].
[0005]So, a medical practitioner, a nurse, a pharmacist, or other medical people have to mix a diluent with drugs. This raises many problems. Restoration operation consumes time and needs aseptic technique. The operator must prepare a suitable diluent and injector before a start. A powder agent is often cake-ized at the bottom of a vial. For this reason, when a liquid is injected into a vial from an injector, the contact surface product between a liquid and a powder agent has a completely small thing at the beginning, therefore carries out mixing operation to time consumption further. It is made difficult for

the limited vial capacity that increase in a diluent and the drug concentration which goes ends a restoration process. Although it can try for an operator to solve this by injecting a solution, and mixing and attracting it into a vial repeatedly, this needs movement of an excessive injection and an injector and makes the possibility of contamination increase. The time taken for it to be sometimes difficult to take all of drugs and/or liquids out out of a vial, and to carry out restoration operation for this reason is made to increase.

[0006]Restoration operation must be preferably carried out by an aseptic condition. It is difficult for such a demand to make an operator unjust still more careful, and to often maintain an aseptic condition in addition to consuming time further. In a certain case, the laminar flow hood with which restoration operation is carried out under it may be needed.

[0007]A certain drugs like a chemotherapic drug are poisonous. During restoration, the exposure to the drugs of an operator can become dangerous, if an operator works such drugs every day and is exposed to them repeatedly.

[0008]Other problems are that restoration operation provides the source of confusion about which container has accommodated which drugs. The drugs injected to it and the name of the patient to whom it must be emitted must be marked on a diluent container.

[0009]When drugs are restored and it is inhaled into a glass syringe, in a certain case, drugs can be injected promptly to a patient's venous system. However, more typically, for connection with the intravenous administration set from an injector, the restored drugs are poured in to large solution vessels, as discussed in the top. This is because it is in such still higher concentration that the restored drugs in an injector often generate local toxicity in the vein of the patient near [with which a needle stabs the skin] the injection site. This may generate a harmful heavy vein stimulus medically. In addition, the proper dose of medication is contained in the injector, however instant injection into a patient's blood flow may generate the state of such high systemic toxicity that the drug concentration level in the whole patient blood style is dangerous.

[0010]One of the Reasons of still others which are not directly injected from an injector to a patient is that it makes a patient generate the excessive injection site which is painful for a patient and provides other opportunities to infection.

[0011]The restored drugs are more typically injected into a diluent container for these Reasons.

[0012]A patient can be medicated with glucose or the salt solution emitted through an administration set like TORABE Norian and the CONTINUFLO administration set currently sold from lab RATORIZU from a typical for example, large capacity parenteral container like 1L container. Supposing restoration drugs are injected into a mass parenteral container, discharge of drugs will be emitted over time to be usually too long. These mass fluid is often emitted by a very late flow.

[0013]The restored drugs are injected still more typically into a small capacity parenteral container like TORABE Norian and the 50-ml container currently sold by lab RATORIZU. This mini bag container is hung by the altitude higher than a mass parenteral container, and is connected to the injection site on a primary administration set by the secondary administration set. Since [that it is higher] it is maintained highly, after the restoration drugs in a small capacity container are emitted, the fluid from a mass container begins to flow through it once again.

[0014]United States patent No. 4,410,321 by which all the closed restoration discharge systems were transferred to the grantee of this invention; 4,411,662; It is indicated by 4,432,755 and 4,458,733. A container contains drugs and a diluent in a separate compartment, and before drugs are emitted to a

patient, in a closed system, they are restored, as shown there. Typically, this container is connected to the administration set connected in the other end of a primary administration set which had the small capacity parenteral container discussed in the top. The container shown in these patents solves many of problems relevant to injector restoration. However, this product needs a series of restoration steps which must be carried out before a nurse or other operators emit a fluid from a container.

[0015]In the mode which does not need the restoration step by an operator, discharge of drugs or other useful **, ARUZA of Palo Alto, California, United States patent No. 4,424,056 transferred to condominium ration; 4,432,756; 4,439,183; 4,474,574; 4,479,793; It is shown in 4,479,794 and Canada patent No. 1,173,795. The parenteral discharge system which has a formulation room for prescribing useful ** like drugs for the patient in it is indicated as indicated by these patents. In providing restoration of drugs by flowing fluid, for example from a mass parenteral container through an administration set including the formulation room which has drugs in it, this system is advantageous. This system seems to mean eliminating the necessity for restoration operation of consuming the above mentioned time, and to eliminate the problem relevant to restoration operation.

[0016]other passive restoration systems -- AKUCHIE of Sweden -- bora -- it is indicated by European Patent No. 0059694 of get and hustle.

[0017]The instrument of still others for being in-line, namely, emitting drugs in an administration set is indicated by Australia patent No. 15762 / 83 transferred to the tiba of Switzerland, Guy Gee, and AGE, and corresponding European Patent No. 0100296. This instrument holds drugs and includes the section through which a liquid passes to the general trend through which a liquid flows into a patient, and a parenchyma top counter direction.

[0018]In addition it is going to provide in-line drugs restoration, other systems are shown without restoration by the nurse or the help by other operators in United States patent No. 4,465,471 transferred to and [IRAI of State Indianapolis of Indiana, a lily], and a company. This patent indicates the structure for the socket in the administration set itself. Another cartridge which accommodated the drugs which should be restored and should be emitted to a patient is packed into this container. When a liquid comes out of a cartridge and a container restoration and after that [of drugs] and invades into a cartridge for discharge to a patient, most most [parts or] continue flowing through an administration set, and they bypass a cartridge thoroughly.

[0019]And [IRAI, a lily,], the Europe patent application ****** of a company Including a vein administration set and a drugs vial, No. 0146310 is related with the system for the drugs restoration using a vial vacuum, in order to restore drugs.

[0020]U.S. Pat. No. 4,534,758 of AKAZU and others indicates the comparatively complicated drugs discharge system provided with various kinds of valves. When the liquid from a container is emitted into a drugs vial, a vial is stirred sufficient time to suspend dry drugs before.

[0021]The eye back of San Diego, California, and U.S. Pat. No. 4,581,614 of Millard and others transferred to condominium ration indicate the selector valve for emitting the drugs beforehand restored to the patient through the intravenous administration set from the drugs vial.

[0022]All the announcements indicated above are turned to the solution to the problem relevant to the restoration operation and it which consume time. In most proposed solution, it has intention of discharge of drugs being passive, i.e., once it is put into drugs into an administration set, do not need the restoration step by a help. Other common features of the tried solution which was indicated during these announcements having discharge of drugs possible for the fluid flow rate to a patient in an unrelated

mode on parenchyma through an administration set is having intention. These systems are designed emit a dose with drugs to within a time [beforehand selected] within a wide range fluid flow rate if the another better one is carried out. Although it changes with drugs and doses, discharge of drugs unrelated to a flow is preferred in order to ensure that a dose required for within a time [which are about 20 thru/ or 30 minutes typically / which can be permitted remedially] is emitted.

[0023]By making discharge of drugs and other useful ** unrelated to a flow, a system ensures that drugs will not be quickly emitted too much even if a flow is highly set too much by the nurse or other operators, and prevents the problem of the systemic toxicity discussed in the top.

[0024]United States patent No.4,424,056; The thing with document like 4,479,793; and 4,479,794, ** is mixed after all, it has useful ** arranged in the administration set for emitting to a patient in-line one, and discharge of ** is turned to the system which can be carried out to the capacity to which the fluid was given. The valve which controls a fluid stream can operate with a help so that ** may be emitted in the mode which can be dependent on a fluid stream.

[0025]The system (namely, thing which does not carry out necessity for another stirring or mixing step) of the automatic-reinstatement type discussed at least in the top wears a possibility that the concentration of useful ** in the liquid emitted to a patient will become high too much in a low flow. This generates local toxicity to a patient [near the introduction point to the inside of the body]. ********** entitled "the drugs ejecting device which prevent a part and systemic toxicity" with which it applied for this problem on December 3, 1984 of Thomas, E, and the need hams which were transferred to the grantee of this invention Invention indicated by No. 721,999 is solved. Other solution over passive mixing of useful **, and the problem of discharge to a patient, Brian, ********** entitled "the housing which enables passive mixing with useful ** and diluent" of ZUDEBU and others for which it applied on December 3, 1984 transferred to the grantee of this invention after all It is indicated to No. 721,991. This application Naka has disclosed some housing structures for emitting useful ** to a patient. Typically, housing contains the cartridge of the different body which contains in the medical-application liquid administration set the socket arranged in-line one and useful **. It is inserted in a socket when it wishes that a cartridge will emit useful ** to a patient. The positive restoration by the nurse or other operators is not needed. Instead, once a cartridge is inserted in a socket, the liquid which flows from a medical-application dietary source of liquid through an administration set will flow into a socket and a drugs content cartridge, and will restore drugs. The solution which had drugs in it flows through an administration set into a patient's venous system from a socket in the lower stream.

[0026]Probably, it will be desirable to have an administration set suitable for passive mixing of useful drugs and discharge to a patient which does not need outside environment and a free passage at all.

[0027]Probably, it will be desirable to have the structure of the socket in the administration set which can manufacture easily and permits attachment of a cartridge simply and effectively to it. Probably, it will be desirable to provide the socket which ensures that the liquid which flows into a socket flows without the leakage which bypasses a cartridge through a cartridge.

[0028]Probably, it will be desirable to provide the socket which contains at least the improved thrusting part which can be equal to repetitive insertion and removal of one or more of cannula between the intermittent periodic duties of two or more cartridges in the socket single without the possibility of careless removal of the part with which it can run through.

[0029]Probably cost will be cheap, probably manufacture will be easy and it will be desirable to have a cartridge which accommodates useful ** of a design which provides easy quick and suitable alignment

wearing on a socket.
[0030]Probably, it will be desirable to change the drug concentration which the liquid which flows a cartridge into the lower stream toward a patient about the given cartridge design selected beforehand.
[0031]Probably, it will be desirable to provide the cartridge which accommodates useful ** which ensures a suitable fluid passage for a cartridge design to emit a suitable quantity and concentration of drugs to a patient.
[0032]Outline this invention of this invention eliminates the manual step which the time required for restoration of drugs or other useful ** requires. This invention emits a medical-application solution to a patient, and provides improvement of an administration set suitable for accommodating the cartridge of the improved design which accommodates useful **. In one example, an administration set is unnecessary at all in connection of a cartridge and an air outlet to a socket, permits exclusion of the air from [from the inside of a cartridge] after, and forms the system closed thoroughly.
[0033]in one desirable example -- an administration set -- a medical-application liquid source -- and the fluid lead pipe which includes the upper stream and the downstream connecting means for connection to the patient's venous system, respectively is included. The socket for accommodating the cartridge containing useful ** is attached along with a fluid lead pipe. the liquid which flows through a socket when installing a cartridge to a socket -- all flow through a cartridge in part preferably at least. The administration set contains the air flask for having an entrance and an exit downstream from a socket, and holding some air in it further. When a cartridge is inserted in into a socket, it fills up with a cartridge automatically with the liquid which flows into a socket. Although the air in a cartridge flows into an air flask downstream, it does not flow into a patient downstream any more.
[0034]In the desirable example, all the liquids in which an air flask flows into the lower stream toward a patient contain the granular material barrier which must flow through the barrier concerned and which serves as a filter which removes all the particles in a liquid.
[0035]The administration set of this invention includes the minimum on an air flask which provides the operation of an administration set in the right hydraulic fluid level in an air flask, and the highest hydraulic fluid level directions.
[0036]It may have bacteria inhibition air exhaust openings downstream from said socket or a cartridge chamber into said liquid lead pipe instead of an air flask. The entrance and exit where the socket was suitable for connection to the upper stream and the downstream part of the fluid lead pipe, about the thrusting part run through with two cannula of a cartridge, one outside of the cannula which is related at least with a thrusting part, and is put in order, therefore passes at least along a thrusting part, and invades into a socket, and liquid -- elasticity bushing in the socket engaged densely is included. It forces that a socket flows through it in this mode first when the cartridge containing ** with all the useful liquids emitted to a patient is connected to a socket.
[0037]The cartridge includes the closing means for closing the chamber for useful **, and this chamber with which it can run through preferably. A cartridge is attached on a socket and the adapter means for providing the alternative fluid communicating between a socket and a chamber is attached to the surroundings of a chamber.
[0038]This adapter means includes further the passage means containing the chamber and the socket **** means. This passage means includes the exit passage other than a chamber in the entrance road in a chamber, and according to.
[0039]A chamber and the adapter passage means can run through with a chamber selectively by a

chamber **** means, and they can slide it freely relatively so that it may put on the free passage which opened the chamber inlet passage and the exit passage by it.
[0040]A chamber **** means actually runs through with a chamber, when a cartridge **** means runs through with a cartridge, an entrance and an outlet passage extend into a chamber each one, and a cartridge is designed so that an outlet passage may be arranged at an altitude higher than an inlet passage. It helps to prevent the drugs of high concentration, so that it is dangerous from this producing effective mixing with the liquid in a chamber, and useful **, and being emitted to a patient. The base plate which the cartridge crossed an upright cylinder and this upright cylinder, and was attached in the desirable example, And this base plate is passed, it is attached and the 1st of a base plate prolonged inside the upright cylinder in one side at least and the 2nd hollow cannula are included in the upright cylinder and the direction of the parenchyma top same axle.
[0041]In the both sides of a base plate, it has extended each one of hollow cannula. It **** each one like [both] the thrusting part of the stopper which has closed the tube shape chamber in which both cannula has accommodated useful drugs and which can run through, and a cartridge accommodation socket, including [therefore] the 1st and 2nd edged ends. The 1st hollow cannula is shorter than the 2nd cannula in the both sides of a base plate. It is equipped with the tube shape chamber containing useful drugs in an upright cylinder, enabling a free slide. A tube shape chamber can be slid to the 2nd position that ran through with the stopper with which both 1st and 2nd cannula can run through from the 1st position with which the stopper is not run through with hollow cannula.
[0042]** with a cartridge chamber useful in other one example of this invention -- the barrier concerned -- and the granular material barrier held between chamber closing implements is included. When the 2nd longer outlet passage means is inserted into a cartridge chamber, a granular material barrier is ****(ed).
[0043]Reference of the detailed explanatory view 1 illustrates the administration set 20 for emitting the medical-application liquid 22 stored in a medical-application liquid source like the mass parenteral liquid container 24 to the patient 26. The administration set 20 contains the fluid lead pipe 28 made from the flexible poly chloridation polyvinyl chloride tube. An upper connecting means like the standard intravenous administration set spike 30 is attached to the upstream end of the fluid lead pipe 28. The spike is suitable for ****(ing) the film of the container administration port 32.
[0044]The fluid lead pipe 28 includes a downstream connecting means like the RUA taper 34 with which the downstream end of the fluid lead pipe 28 was equipped. The RUA taper 34 is connectable with the catheterization of vein 36 according to standard technology.
[0045]The administration set 20 can include further the standard injection site 38 for pouring in a medical-application liquid with a needle through the injection site 38 with which it can run through. The administration set 20 can include further a flow control means like the standard roller clamp 40 with which the surroundings of the flow lead pipe 28 were equipped.
[0046]The administration set 20 contains further the peculiar socket 42 shown in drawing 2 in detail. ********** which applied for the socket 42 on December 3, 1984 It is improvement of the socket currently indicated by No. 721,991. It is equipped with the socket 42 along with a fluid lead pipe, and it is suitable for accommodating the cartridge 44 of the different body shown in drawing 4 thru/or drawing 9, and drawing 10 which have accommodated useful **. When equipped with a cartridge on a socket, all liquid flows through a cartridge in part preferably at least, before being sent in the lower stream toward a patient from the medical-application dietary-source-of-liquid container 24 which flows into the socket 42 through the fluid lead pipe 28 out of a socket.

[0047]Drawing 1 and the air flask 46 shown in 3, 7, 8, and 9 are downstream from the socket 42. When equipping up to the socket 42 of the administration set 20 with a cartridge, the air flask 46 permits automatic priming of the cartridge 44, so that it may explain in detail later. This air is prevented from the air flask 46 absorbing the air arranged in the cartridge 44, and passing it to the lower stream toward a patient.
[0048]If drawing 3 is referred to, the upper fluid lead pipe 28a is equipped with the air flask 46, and it includes the entrance 48 which receives a fluid from it. The downstream fluid lead pipe 28b is equipped with the air flask 46, and it includes the exit 50 which shifts to it. The fluid lead pipe 28 can be equipped with an entrance and an exit by interference fitting, solvent bonding, etc. The lower stream of the socket 42 is equipped with an air flask.
[0049]In a desirable example, as for the air flask 46, it is equipped with the cylindrical shape side attachment wall 56 of a desirable optically transparent flexible material like polyvinyl chloride between them, including respectively an entrance and the port end caps 52 and 54. The liquid included in the air chamber 58 falls toward the exit 50 from the droplet formation orifice 60 which the side attachment wall 56 and the end caps 52 and 54 formed the air chamber 58 which has larger sectional diameters than the inside diameter of the fluid lead pipe 28, therefore adjoined the entrance 48. For this reason, the air flask 46 provides the collecting container of the air in the administration set 20.
[0050]The air flask 46 contains further the granular material barrier 62 like the granular material screen with which it was equipped in the about 50-exit plastic rings 64. The sterilization filter which has about 0.2 micron in a call aperture actually may be sufficient as a granular material barrier. A call aperture may be larger like the large drop-like thing barrier which has about 20 microns in a call aperture. In a desirable example, a call aperture is about 10 microns. Nylon mesh material which is supplied by the filter of Hebron, Illinois, and the tech may be sufficient as a screen. It is horizontally equipped with the granular material barrier 62 to a channel so that all the liquids which pass the air flask 46 may pass the granular material barrier 62.
[0051]Although it is not necessary to arrange the granular material barrier 62 in the air flask 46, it must be equipped with a barrier downstream from a socket so that all the liquids which come out of the inserted cartridge may pass a granular material barrier. It is not separated by the upper fluid lead pipe 28a, for example, but the socket 42, the air flask 46, and the granular material barrier 62 can also be constituted as a single unit.
[0052]In a desirable example, as for the air flask 46, they can consist of a surrounding line of the periphery of the air flask 46 including the minimum hydraulic fluid level directions 66 and the highest hydraulic fluid level directions 68. Preferably, the hydraulic fluid levels in the air flask 46 must be somewhere in minimum and middle highest hydraulic fluid level directions, just before inserting into the socket 42 of the cartridge 44.
[0053]The improved socket 42 includes the socket entrance 70 and the socket exit 72 which were connected to the fluid lead pipe 28. The air flask 46 is arranged downstream from the socket exit 72.
[0054]The socket 42 contains the upper part and each of lower part fixtures 74 and 76. The lower part fixture 76 contains the fluid acceptance segment 78 with the downstream end in the upstream end and the exit 72 in the exit 72 and the entrance 70, and fluid communicating, and fluid communicating.
[0055]It is equipped with the part 80 with which it can run through in a socket, and it is caught between the upper part and the lower part fixture 74 and 76. The part 80 with which it can run through contains the ring shape extension 84 prolonged in the surroundings of the periphery of the main body portion 82

with which it can run through, and the main body portion 82. The ring shape extension 84 includes the expansion periphery further.

[0056]The upper part and the lower part fixtures 74 and 76 are both, are equivalent to the ring shape extension 84 include the expansion periphery 86 on parenchyma, and form the annular groove which accommodates it so that the part 80 with which the upper part and a lower part fixture can run through between them may be caught in an adherence mode. The part 80 is unremovable without decomposing the socket 42. The upper part and the lower part fixtures 74 and 76 are joinable by adhesives, an ultrasonic ceiling, etc. Since two or more KASHITO ridges 44 which have two **** cannula each one between the usable lives of the socket 42 and the administration set 20 are inserted repeatedly and drawn out from a part, being maintained firmly is important for this part in a socket. Generally the fluid acceptance segment 78 contains the same axle tapered portion 90 with it under the part 80 with which it can run through. The tapered portion 90 serves as needle guides to the inside of the elasticity bushing 92.

[0057]Elasticity bushing is built with a desirable elastomer like polyisoprene. The elasticity bushing 92 forms the narrow penetration boa 94. About the part 80 with which it can run through, the elasticity bushing 92 is located in a line, and is arranged, therefore the penetration boas 94 are the tapered portion 90 and the parenchyma top same axle.

[0058]If it changes to drawing 4 thru/or 9, the cartridge 44 for introducing drugs or other useful ** into the fluid lead pipe 28 in the socket 42 for discharge of this ** to a patient is illustrated.

[0059]The cartridge 44 contains the base plate 98 which crosses the upright cylinder 96 and an upright cylinder and with which it is equipped. It was equipped with each 1st and 2nd hollow cannula 100,102 through the base plate 98, and even if there are few base plates 98, in one side, it has extended to the inside in the upright cylinder 96 and the real Kamihira line. It has extended on both sides of the base plate 98 each one of the hollow cannula 100,102. The 1st hollow cannula 100 contains the 1st edged end 100a suitable for ****(ing) the stopper 104 which can run through. 1st hollow KANYURE 100 contains the 2nd edged end 100b reversely [of the 1st edged end 100a] again. Similarly, the 2nd hollow cannula 102 contains the 1st edged end 102a suitable for ****(ing) the stopper 104 which can run through. 2nd hollow KANIRE 102 contains the 2nd edged end 102b in the opposite hand of the edged end 102a again. The 2nd hollow cannula 102 is prolonged in a long distance in the both sides from the base plate rather than the 1st hollow cannula 100.

[0060]Although the cartridge 44 contains further the tube shape chamber 106 which has accommodated useful ** 108 like the dry powder agent, a liquid may be sufficient as this **. The stopper 104 or other closing means which were expressed above and with which it can run through close the tube shape chamber 106.

[0061]Reference of drawing 6 will equip with the stopper 104 which can run through in the mouth 110 of the tube shape chamber 106. The stopper 104 made of rubber can adhere in a tube shape chamber in the mode which was similar to adherence of the stopper of a standard drugs vial with the surrounding metal band 112 of the mouth 110 and the stopper's 104 periphery. It is equipped with the tube shape chamber 106 in the upright cylinder 96, enabling a free slide so that the stopper 104 may meet the base plate 98. The tube shape chamber 106 is maintained at the perfect engagement from the cylinder 96 by the tongue 114 prolonged from the upright cylinder 96. The tongue 114 engages with stopper 104 and metal band 112 assembly prolonged outside from the side attachment wall of the tube shape chamber 106 so that it may illustrate to drawing 6. The stopper 104 which can run through can include the diameter space 116 of a cone facing the inside of the chamber 106. Instead of the stopper which can run

through, other closing means with which it can run through can be established.
[0062]When the cartridge 44 is in drawing 4 and the 1st position shown in 6 and 7, the stopper 104 made of rubber is run through by neither of the 1st or 2nd hollow cannula 100,102. In a desirable example, the stopper 104 which can run through continues being separated from the 1st and 2nd cannula 100,102, when the tube shape chamber 106 is in the 1st position.
[0063]The 1st and 2nd cannula 100,102 constitutes a passage means. The 1st short hollow cannula 100 provides the entrance road to the inside of the tube shape chamber 106. The 2nd long cannula 102 provides the exit passage from the chamber 106. A passage means forms a part of adapter means suitable for equipping with the cartridge 44 on the socket 42 containing an upright cylinder. An adapter means is slid about the chamber 106. The hollow cannula 100,102 can slide the inside of the upright cylinder 96 so that other examples may see later. If it puts in another way, the tube shape chamber 106 and an adapter means can be selectively slid about mutual.
[0064]An adapter means can be prolonged from the base-plate 98 side opposite to the chamber 106, and can contain the key groove means of it and the same axle further on parenchyma. The key groove means can include the comparatively upright key groove wall 118 include the key groove slot 120 for fitting in on the socket 42. The key groove wall 118 can contain the groove 122 formed in 1 or two length or more for the corresponding vertical key 124 with which the outside of the socket 42 was equipped again, and engagement. A key groove means ensures suitable engagement with the socket 42 with which the cartridge 44 is related, including suitable arrangement of the 1st in a socket, and the 2nd hollow cannula 100,102.
[0065]The chamber 106 of the cartridge 44 until the stopper 104 which can run through contacts to the base plate 98 which serves as a stop from the 1st position shown in drawing 4, It can slide to the 2nd position shown in drawing 5 obtained by pushing the chamber 106 below within the upright cylinder 96. In this position, the 1st and 2nd cannula 100 and 102 has run through with the stopper 104 which can run through, therefore the edged hollow ends 100a and 102a of the 1st and 2nd cannula 100 and 102 are in chamber 106 inside and a free passage. The end 102a of the 2nd cannula 102 is in the deep inside of the tube shape chamber 106, and is near the apex 126 of the chamber 106 preferably. The edged hollow end 100a of the 1st cannula 100 is in the tube shape chamber 106 exactly preferably like [in a part for the hollow circle cone-shaped part 116 formed by the stopper 104].
[0066]In an operation, before useful ** 108 in a cartridge is emitted to a patient, the administration set 20 of this invention operates by establishing the fluid channel opened between the medical-application liquid container 24 and the patient 26 so that it might illustrate to drawing 1. The liquid 22 flows through the administration port 32 and the spike 30 from the container 24. A liquid passes along the fluid lead pipe 28, and flows into the order through the socket 42 through the socket entrance 70, the fluid acceptance segment 78, the tapered portion 90, the penetration boa 94, and the exit 72. A liquid passes along the connection lead pipe 28, and flows into the air flask 46 through the droplet formation implement 60. Air accumulates in the air flask 46, and a liquid passes along the flask exit 50, passes along the downstream conduit part 28b, and continues flowing into a patient through the RUA connector 34 and the catheterization of vein 36 in the lower stream.
[0067]Before the administration set 20 is put on the patient 26 and a free passage, priming of the fluid lead pipe 28 is carried out, namely, air is eliminated. By permitting that a liquid flows through a set, this is carried out in a known mode, before connecting with a patient.
[0068]Since the level 128 in the air flask 46 raises a hydraulic fluid level so that a hydraulic fluid level

may come between the minimum and the highest index lines 66 and 68, in a standard mode, the air flask side attachment wall 56 can be suppressed like most dropping rooms, and can be released.

[0069]When it desires to emit useful ** 108 like drugs to a patient, it is equipped with the cartridge 44 which has ** 108 useful in it in it on the socket 42. Drawing 7 illustrates the cartridge 44 and the socket 42 before being equipped before the operation of a cartridge, and with it on a socket.

[0070]The cartridge 44 is provided in the state where the chamber 106 is in the 1st position to a nurse or medical people, as shown in drawing 4 and 7. The cartridge 44 only grasps the upright cylinder 96, and operates by pushing the crowning 126 of the chamber 106 below with the thumb. This is first stuffed into the 2nd cannula end 102a and the next through the stopper 104 which can run through with the 1st cannula end 100a. The tube shape chamber 106 is pushed below until it is restricted by contact with the closing implement 104 and the base plate 98 with which movement beyond it can run through. This 2nd position is illustrated by drawing 5.

[0071]It is equipped with the cartridge 44 which now is in the 2nd position on the socket 42 so that it may next illustrate to drawing 8. It is important that the 1st and 2nd cannula 100,102 is arranged in the specified position in a socket. With the key groove wall 118 which has the key groove slot 120 in it, this. the slot 120 is guided in the bridge 130 top of the upper part fixture 74 on the socket 42 -- it is provided more and provided by the groove 122 formed in the length in the key groove wall 118 which fits in on two or more vertical keys 124 with which the surroundings of the socket 42 were equipped further. In the illustrated desirable example, the key groove wall 118 contains the three vertical keys 124 on a socket, and the three formed grooves 122 fit in.

[0072]In [if drawing 9 is referred to] the handle 132 the cartridge 44 single hand the socket 42, and -- grasping the upright cylinder 96 by the hand of another side -- and the 2nd end 102b of the 2nd cannula -- and the thing for which the cartridge 44 is pushed below so that the 2nd end 100b of the 1st cannula short next may **** the main body portion 82 of the part 80 which can run through with both -- more, It is easily equipped on the socket 42 at the mode shown in drawing 8. the cartridge 44 continues being pushed below, therefore the 2nd hollow cannula 102 goes into the penetration boa 94 -- and the surroundings of the periphery of the 2nd hollow cannula 102 -- the bushing 92 -- liquid -- engagement is carried out densely. The base plate 98 contacts the crowning of the fixture 74, and suitable wearing occurs, after restricting downward movement beyond it of the cartridge 44.

[0073]As shown in drawing 9, when the cartridge 44 and the socket 42 are engaged, the liquid 22 which flows into a socket at the entrance 70 flows through the fluid acceptance segment 78. The elasticity bushing 92 is carrying out the seal of the surroundings of the 2nd hollow cannula 102, and the liquid 22 prevents passing to the lower stream directly. Instead, the liquid 22 goes into the 2nd end 100b of the 1st cannula 100, and goes into the tube shape chamber 106 in the 1st end 100a of cannula.

[0074]When the liquid 22 goes up within the chamber 106, the residual air in the chamber 106 is extruded through the 2nd cannula 102 in the lower stream. Air goes into the air flask 46 through the droplet formation machine 60, and accumulates in the flask 46. The first hydraulic fluid level 128 illustrated to drawing 1 descends to a new level to which it pointed by the line 134. The hydraulic fluid level 128 so that air may be caught and the hydraulic fluid level in the air flask 46 may not descend to the flask exit 50 by which it may be washed away toward a patient in the lower stream, when air leaves the cartridge 44, Before insertion into the administration set 20 of the cartridge 44, it must be above the minimum hydraulic fluid level directions line. Although the hydraulic fluid level after priming of the

cartridge 44 may be below the minimum hydraulic fluid level 66, if it is above the minimum line 66, the hydraulic fluid level 134 will never become before insertion of the cartridge 44 lower than the exit 50.
[0075]The highest hydraulic fluid level directions 68 serve as a guide for the highest hydraulic fluid level which the droplet which goes into the air flask 46 through the droplet formation machine 60 can count in addition in a standard mode.
[0076]It continues going up until the hydraulic fluid level in the tube shape chamber 106 reaches the edged end 102a of the hollow of the 2nd cannula, Then, the liquid 22 passes along the 2nd cannula 102, and begins to flow out of the chamber 106 into the air flask 46 through the lower stream and the droplet formation implement 60 through the 2nd end 102b. The liquid which leaves the chamber 106 has the suitable concentration of useful ** 108 mixed with it for discharge to a patient. The upper part liquid passage formed in the chamber 106 with the 1st and 2nd cannula 100,102 forms a density gradient within the chamber 106 so that as highly as the drug concentration in the liquid 22 left in the cannula end 102a generates the local toxicity to a patient. Local toxicity is in the situation which a vein stimulus may generate near the intravenous injection part, when the drug concentration of the effluent inside of the body is too high.
[0077]Generally the drugs burst size to a patient is unrelated to this flow in a typical liquid flow rate per unit time. The total amount of the drugs emitted to a patient per unit time as used in the flow in which this is very high means not being so high as systemic toxicity being generated to a patient. If it puts in another way, the patient will not be introduced into within a time [too much short] in the drugs which are to the inside of the body.
[0078]In a low liquid flow rate, the rate of the drugs emitted to a patient per unit time is in the tendency for which it comes to depend on the liquid flow rate which passes along the administration set 20 further. It is believed that the maximum of the drug concentration in the liquid 22 which leaves the chamber 106 is restricted to the safe highest for the two main Reasons. The density gradient formed in the column-like tube shape chamber 106 means that the concentration of the liquid 22 in the intrusion point to the 2nd cannula 102 is the minimum in which height in the tube shape chamber 106. When increasing the danger of the high drug concentration which the liquid flow rate which passes along the administration set 20 becomes less, and cannot usually be permitted [2nd] to a patient, The quantity of the liquid turbulent flow which was formed in the chamber 106 and to mix also becomes less, and a density gradient is expanded so that the difference of the density from the stopper's 104 zone to the 1st end 102a of the 2nd cannula 102 may become large.
[0079]In [should care about that an above-mentioned different liquid flow rate is only possibility, and] a desirable work mode, A nurse or other medical people will set the flow which can be permitted by a flow limit means (it is (like the roller clamp 40 or a peristaltic pump)), and will not adjust a flow again to the discharge backward of ** 108 useful at least.
[0080]The administration set 20 provided with the peculiar cartridge 44 and the socket 42 can emit ** 108 with a remedially useful useful quantity to within a time [remedially permissible]. For example, the 1g dose of the ampicillin in the chamber 106 can be emitted in about 30 minutes in the flow of 120ml/hour.
[0081]In a desirable example, the tube shape chamber 106 has a capacity of about 10 ml, and can contain the air up to about 3 thru/or 4 ml. The inside diameter of a tube shape chamber is about 0.4 inch (1.061 cm). The height of the tube shape chamber from the mouth 110 to the crowning 126 is about 2 inches (5.08 cm). As indicated to U.S. Pat. No. 721,991 for which it applied on December 3, 1984, The

amount of [116] hollow circle cone-shaped part of the stopper closing implement 104 with which it can run through helps mixing, and it is believed to form an additional turbulent flow in the intrusion point of the liquid 22 in the 1st end 100a of the 1st cannula 100. The chamber 106 of comparison low length is, and narrow form is believed to help mixing with the liquid 22 of useful ** 108. For example, a 5% glucose solution may be sufficient as the liquid 22.

[0082]By changing the size of the tube shape chamber 106, it should note that the discharge profile of useful ** 108 is changeable. For example, it will start for a long time by emitting ** 108 in the chamber 106 to the patient 26 by expanding the inside diameter of a tube shape chamber. Similarly, lengthening the chamber 106 will extend discharge time, if the 2nd cannula 102 is extended within the long chamber 106.

[0083]Other administration sets 136 for emitting the useful drugs 108 using the socket 42 and the cartridge 44 of this invention are illustrated by drawing 10, and the same element is described by the same number in it. The administration set 136 helps priming of the set 136 including the standard flexibility plastic dropping room 138 for counting droplet. It is equipped with the socket 42 downstream from the dropping room 138.

[0084]The air flask 46 is not contained. Even when equipped with the cartridge 44 on the socket 42, other means for discharging air from the cartridge 44 beyond it are formed. The air exhaust openings 140 are formed downstream from the socket 42 for this purpose. Air exhaust openings can contain a bacteria inhibition hydrophobic film. The air exhaust openings 140 can be made into the part of a liquid filter like the 0.22-micron sterilization filter 142. Such a filter is indicated by U.S. Pat. No. 4,568,366 of Frederic and others transferred to the grantee of this invention. This filter 142 contains the hydrophilic operation air fiber filter element which removes any granular material from the liquid 22.

[0085]drawing 11 -- and -- drawing 12 -- referring to it -- if -- a chamber -- 106 -- upright -- a cylinder -- 96 -- and -- a key groove -- a wall -- 118 -- having been similar -- a chamber -- 106 -- ' -- upright -- a cylinder -- 96 -- ' -- and -- a key groove -- a wall -- 118 -- ' -- containing -- **** -- a cartridge -- 44 -- ' -- illustrating -- having -- **** . Chamber 106' holding useful ** 108 is equipped with stopper 104' which contains metal band 112' in the surroundings of it, and it closes it. Tongue 114' holds tube shape chamber 106' to functional engagement with upright cylinder 96'.

[0086]The base plate 99 which crosses upright cylinder 96' and is prolonged is included in each 1st and 2nd cannula 100 and 102.

[0087]Cartridge 44' of this example contains the needle covers 101 which can be removed from the cartridge which adhered to the base plate 99 enabling free removal. The needle covers 101 which can be removed from a cartridge have a key objective which prevents connecting cartridge 44' to the socket 42, without ****(ing) stopper 104' in the cannula 100 and 102 first. If it puts in another way, the needle covers 101 will ensure that cartridge chamber 106' must be moved from the 1st position shown in drawing 11 to the 2nd position shown in drawing 12, before cartridge 44' can equip up to the socket 42. The cartridge 44 is premature, namely, if it is equipped before the cartridge 44 is moved to the 2nd position, the liquid which flows through an administration set will fall out of 1st end 100a' of 1st cannula 100', without going into cartridge chamber 106'.

[0088]Because of the comparatively small size of key groove wall 118', the needle covers 101 cannot be removed from cartridge 44', when being arranged, as it shows drawing 11.

[0089]The needle covers 101 contain the pin 103 containing the pin portion 105 which decreased in the tip of each pin. The pin is prolonged from the circular needle cover base 109. The base plate 99 contains

the annular ring Mr. groove 107 which accommodates the needle cover base 109 into it. In the point that the opening 111 met the ring Mr. groove 107, it extends through the base plate 99, and the pin 103 is preferably accommodated in interference fitting, therefore the needle covers 101 suit without separating carelessly from the base plate 99.

[0090]tube shape -- a chamber -- 106 -- ' -- a top -- a cartridge -- 44 -- and -- a chamber -- 106 -- being related -- explanation -- following -- drawing 12 -- having illustrated -- the -- two -- a position -- moving -- having -- the time -- running through -- obtaining -- a stopper -- 104 -- ' -- or -- others -- a closing means -- a base plate -- 99 -- contacting -- before -- a pin -- 103 -- being engaged . This downward movement to the pin 103 is forced out of interference fitting which showed drawing 11 the needle covers 101. Now, the tip 113 of the needle covers 101 can be projected exceeding the end of key groove wall 118', can grasp the tip 113, and can remove it by human power. Instead, probably interference fitting does not exist any longer between the base plate 99, a needle, and the covering 101, therefore, now, the needle covers 101 will only fall out of cartridge 44' preferably, since now the narrow pin portion 105 is in the opening 111.

[0091]After removing the needle covers 101, cartridge 44' adheres to the socket 42 in the mode indicated about the cartridge 44 in the top.

[0092]In addition to prevention of unsuitable wearing of a up to [the socket 42 of cartridge 44'], the needle covers 101 prevent contact contamination of the cannula 100 and 102 again.

[0093]Reference of drawing 13 illustrates the alternative example 144 of the cartridge. A similar element holds the same reference number. In addition in this example, the cartridge 144 includes the upright cylinder 96 and the key groove wall 118. The tube shape chamber 146 is closed by closing implement like the stopper 104 with which it can run through. The chamber 146 contains the stage 148 for equipping with a granular material barrier. For example, it was equipped with the granular material barrier in the plastic rings 152 which adhered with heat sealing etc. in the stage 148, it can contain a 5-micron nylon network. Before using the cartridge 144, useful ** 108 continues being caught between the stopper 104 and the net 150. There are no useful drugs 108 into the chamber 146 apex portion 154 by the side of the upper part of the net 150. The explanation about the call aperture about a granular material barrier and material in the air flask 46 of drawing 3 is applied also like the granular material barrier 150.

[0094]The cartridge 144 as well as the cartridge 44 is accommodated in the upright cylinder 96, enabling a free slide. The chamber 146 is in the 2nd position in drawing 13, the 1st and 2nd cannula 100,102 runs through with the stopper 104, since the cartridge 144 is discharge of useful ** in the effluent object 22, it is equipped with this cartridge on the socket 42, and it is illustrated. During an operation, when the chamber 146 slides to the 2nd position, the 2nd hollow cannula 102 runs through with the granular material barrier 150, and is prolonged into the apex portion 154 of the chamber 146 in which useful ** is not stored. When a liquid goes into the chamber 146 through the 1st cannula 100, useful ** 108 is mixed with a liquid like the example indicated above. However, useful ** which enters and goes to the apex portion 154 with a granular material barrier has already dissolved into the effluent object 22. Even the level of the 1st end 102a of the 2nd cannula flows upwards, and the liquid 22 which has useful ** 108 mixed in it is then emitted to the lower stream toward a patient.

[0095]By catching useful ** 108 to the lower part of the tube shape chamber 146, it is believed that a better mixed operation is what may actually be generated. As for the cartridge 144, the 1st end 100a of the 1st hollow cannula operates to best only a few into the chamber 146 in a similar manner [cartridges / 44 and 44] at a certain time.

[0096]Reference of drawing 14 and 15 illustrates the adapter 160 for connecting to the socket 42 a chamber like the standard drugs vial 162 which has ** 164 useful in it in drawing 14. The adapter 160 contains hollow upright SHIERU 166 provided with the vial end 168 expanded for snap fitting engagement with the mouth 170 of the vial 162. The vial 162 contains the rubber stopper 172 which can run through into it. The expanded vial end 168 can include the projection 174. ********** permitted now [of William, an R, Aalto and others] when it applied for the restoration instrument which shows the same step fitting structure on August 21, 1984 It is indicated by No. 642,908. The adapter 160 contains the sliding plate 176 with which it was equipped in hollow upright SHIERU 166 enabling a free slide. The sliding plate 176 includes the projection 178 accommodated in the hollow within a shell wall enabling a free slide. An elastic material and the projection 178 mean standing it still and maintaining the sliding plate 176 until movement is meant.

[0097]It is equipped with the 1st hollow cannula 180 that has the 1st edged hollow end 180a that faces the expanded vial end 168, and the edged end 180b of the hollow which faces contrary to the expansion end 168 in the sliding plate 176.

[0098]The sliding plate 176 is equipped also with the 2nd hollow cannula 182 that has the 2nd edged hollow end 182b that faces contrary to the 1st edged end 182a of the hollow facing the expanded end 168, and the expanded end 168. The sliding plate 176 contains the handle part 184 which projects out of SHIERU 166 in the handle accommodation slot 186 within a shell wall. Upright SHIERU 166 includes the socket accommodation slot 188 in the surroundings of the bridge 130 of the socket 42 for wearing.

[0099]The 1st hollow cannula 180 contains the inlet passage means to the inside of the drugs vial 162 or other chambers. The 2nd hollow cannula 182 includes another outlet passage other than the drugs vial 162. The 1st end 180a and 182a of the cannula 180,182 contains the chamber **** means for ****(ing) the rubber stopper 172 of the drugs vial 162. The 2nd end 180b and 182b of cannula contains the socket **** means.

[0100]In an operation, a nurse or other medical people fit in in the end part 168 to which the adapter 160 expanded the drugs vial 162. An operator grasps the handle part 184 next, and it is moved within the slot 186, This moves the sliding plate 176 and the needle with which it was equipped toward the drugs vial 162, and the rubber stopper 172 is ****(ed) with both 1st and 2nd cannula 180,182. The surroundings of the socket 42 are equipped with the adapter 160 next, SHIERU 166 fits into the surroundings of it, it runs through with the part 80 with which 1st and 2nd KACHURE 180,182 can run through, and the 2nd cannula 182 engages with the bushing 92.

[0101]Reference of drawing 15 illustrates the alternative example 190 of the adapter similar to the adapter 160 shown in drawing 14. Here, the handle part 196 prolonged from the sliding plate 198 contains the air outlet 192 like a bacteria inhibition hydrophobic film and the 0.22-micron sterilization millipore filter 194. The 2nd hollow cannula 200 is formed from two separate segments, the segment 200a which faces the expanded adapter end part 168, and the segment 200b which faces on the contrary from the adapter end part 168. The segments 200a and 200b are in the free passage which crossed the filter 194 and was opened through the inside of the handle part 196. The existence of the air outlet 192 of the operation of the adapter 190 is the same as that of the operation of the adapter 160 except for providing an exit to the air in the drugs vial in priming. It is equipped also with the granular material barrier 194 in the adapter 190, and granular material is prevented from going to the lower stream toward a patient.

[0102]Reference of drawing 24 and 25 illustrates the cartridge 310 containing the upright cylinder 96 arranged in it enabling a free slide of the tube shape chamber 106 which has useful ** 108 in it. The base plate 312 crosses the cylinder 96 and is prolonged. The 1st and 2nd hollow cannula 314,316 containing the 1st edged hollow end 314a and 316a that faces the tube shape chamber 106 each one is arranged in the base plate 312. Like the cartridge 44, The 1st end 314a and 316a of the 1st and 2nd cannula 314,316 the tube shape chamber 106 of the cartridge 310 from the 1st position in non-engagement with the 1st and 2nd cannula the rubber stopper 104 of the tube shape chamber 106. It slides to the 2nd position illustrated to drawing 24 with which it ran through. The cartridge 310 includes the key groove wall 318 prolonged from the base-plate 312 side opposite to the tube shape chamber 106. The key groove slot 320 is formed in the key groove wall 318 around the bridge 322 of the socket 324 for fitting. The key groove wall 318 includes one or more internal projections 326.
[0103]Unlike the cartridge 44, the 2nd edged end 314b and 316b of each 1st and 2nd cannula 314,316 can be prolonged in the same distance from the base plate 312. The socket 324 includes the socket entrance 70 and the socket exit 72 which were connected to the fluid lead pipe of an administration set like the administration set 20. the upstream end where the socket 324 flows with the entrance 70 and which is in a free passage -- and the fluid acceptance segment 78 with the downstream end in the exit 72 and a free passage is included.
[0104]Although the socket 324 does not contain bushing like the bushing 92 in the socket 42, however so that it may indicate in detail later, If the cartridge 310 and the socket 324 are engaged thoroughly, all the liquids which flow through a socket must pass the tube shape chamber 106 first like [in the case of the cartridge 44 and the socket 42 which were indicated above].
[0105]The socket 324, Perilla frutescens (L.) Britton var. crispa (Thunb.) Decne. corresponding to a parenchyma top is carried out to the ring shape extension 334 containing the periphery 336 which Mr. Piston's injection site 338 which was built with the material with which elasticity like polyisoprene can run through, and with which it can run through expanded. The upper part and the lower part fixture 328,330 which form the annular groove 332 which accommodates it are included. Since the one or more nails 340 are the inner protrusion 326 and engagement on the key groove wall 318, it is provided in the surroundings of the outside of the socket 324. The outflow seal 342 can be fabricated in the lower part fixture 330 with the same, comparatively upright plastic material as the remainder of the lower part fixture 330. The outflow seal 342 forms the outflow passage 344 of a larger diameter than the 2nd hollow cannula 316 of the cartridge 310.
[0106]A nurse or other operators push the crowning 344 of the tube shape chamber 106 below, and the stopper 104 makes it slide to the 2nd position illustrated to drawing 24 which contacts the base plate 312 from the 1st position in an operation. As for the cannula 314,316, both **** the part 338 so that it may illustrate to drawing 24. However, the surroundings of the socket 324 are not thoroughly equipped with the cartridge 310 so that it may illustrate to drawing 24. In addition in drawing 24, the part 338 is in the usual position. It can be flowed through the fluid which flows into the entrance 70 through the exit 72 by flowing out without going into the chamber 106, and passing the surroundings of the seal 342.
[0107]Since a cartridge and a socket are engaged thoroughly, a nurse or other operators are further pushed below so that it may reach to the position which the upright cylinder 96 showed to drawing 25 and which was engaged thoroughly. The central climax portion 346 pushes the part 338 below, and it is made to shift from the normal position which illustrated it to drawing 24 to the 2nd deformation position

shown in drawing 25 below by applying downward pressure to up to the cartridge 310 about the socket 324. The part 338 is mutually moved in the right-angled direction on parenchyma to the ring shape extension 334 of a part. In the deformation position illustrated to drawing 25, the part 338 carries out the seal of the surroundings of the outflow seal 342 of a socket. The deformation position of the injection site 338 is maintained by mutual fitting of the engagement protrusion 326 and the nail 340.

[0108]The fluid which now flows into the entrance 70 and the fluid acceptance segment 78 is inevitably turned through the end 314b into the 1st hollow cannula 314 and the chamber 106 which has accommodated useful ** 108. The pressure to the part 338 top flows out with the part 338, and makes a fluid sealant effective between the seals 342 form. A liquid leaves the tube shape chamber 106 through the 2nd cannula 316, comes out of a socket as 72 copies of exits after that, and flows into the lower stream toward a patient.

[0109]The combination of the cartridge 310 and the socket 324 will eliminate manufacture of bushing for forming a single channel, and the necessity for an assembly, once engagement of the cartridge is carried out to the surroundings of a socket. After useful ** is emitted to a patient, the part 338 can return to the normal position shown in drawing 24 then by the ability to remove a cartridge, as for an operator, therefore it can be directly flowed through a liquid through a socket. The cartridge 310 can adhere through the socket 324 after that, and the part 338 is then forced again to the deformation position shown in drawing 25.

[0110]Reference of drawing 16 and 17 illustrates the cartridge 202 described in the reference number with same, same element. The cartridge 202 contains the tube shape chamber 106 and the upright cylinder 96.

[0111]Here, in cannula, the number of the 2nd hollow cannula 204 is at least one, and it contains two or more desirable orifices 206 in the lower part of the 1st edged end 206a, and the upper part of the base plate 98. The orifice can do formation ****** by use of laser. Having the cartridge 202 of the given size, the number of the orifices 206, arrangement, and change of the size will change the concentration of useful ** which should be emitted to a patient with the medical-application liquid 22. According to the number of orifices, a size, and arrangement, the divided specific concentration profile of the drugs in a liquid was formed. When a liquid goes into the chamber 106 from the 1st cannula 100, a hydraulic fluid level rises. Like the cartridge 44, a concentration gradient occurs along with the height of the chamber 106, and the concentration of drugs or other ** is the maximum by about 104 stopper, and the minimum 1st near the end 206a of the 2nd cannula. By the various orifices 206, it is permissible that some concentration layers come out of the chamber 106. The size and interval of the outlet orifice 206 determine the time of the layer of the following concentration level coming out of a cartridge. Although it is believed that the cartridge of this invention indicated in this Description has none of these orifices 206, and it operates good, use of the orifice 206 must be useful about a certain drugs with more difficult discharge.

[0112]The following formulas can express the quantity of useful ** emitted to the lower stream toward a patient within a time [which was given].

$DD=C_1Q_1+C_2Q_2$. ..... C_NQ_N -- DD is equal to the quantity of the drugs emitted in unit time here, and C_N is equal to the drug concentration in a fluid level or the layer N, and Q_N is equal to the quantity of flowing fluid through the hydraulic fluid level within the given unit time, or the orifice 206 in the layer N.

[0113]Q_N about a specific orifice is dependent on the liquid flow rate which passes along the size of the orifice, the number of the low orifices of the cannula 206 which exist highly and a size, and an administration set. Each orifice 206 can have the same orifice that counters it and directly on the cannula 204. If the given amount of maximum flow appearance which exists highly or is permitted by the orifice 206 under it is smaller than the liquid flow rate to the chamber 106, the liquid will go up to the high orifice 206 to the next in a chamber.

[0114]Drawing 18 thru/or 23, and the cartridge 208 for introducing useful ** into a fluid lead pipe, if it changes to especially drawing 18 thru/or 20 are indicated. The cartridge 208 includes the wall 210 which forms the chamber 212 which has useful ** 214 in it. The glass drugs vial containing the neck portion 218 with the open end which forms the body part 216 and the mouth 220 may be sufficient as the cartridge wall 210. It is equipped with a closing means like the stopper 222 which can run through with which it can run through in the head 218 of the mouth 220 and the cartridge 208. the lateral surface 224 where the stopper 222 faces the chamber exterior -- and the medial surface 226 facing the formed chamber 212 is included.

[0115]the stopper 222 which can run through -- the outside lid part 228 -- and the narrow plug portion 230 can be included. The lid part 228 contacts the end of the mouth 220, and the plug portion 230 is prolonged into the neck portion 218 of the chamber 212.

[0116]The chimney-like projection 232 is prolonged in parenchyma top rectangular directions to the stopper's 222 lid part 228 with which it can run through if it puts in another way in the parallel direction on parenchyma from the medial surface 226 at the length of a cartridge. The chimney 232, the plug portion 230, and the lid part 228 can be formed from the single piece of material like polyisoprene.

[0117]The closing means and the stopper 222 which can run through in this case are suitable for being run through in the point which aligned to the zone of the inside 234 of the chimney 232, the point which aligned, and the medial surface 226, and the exterior of the chimney 232. These two points are marked by each of reference numbers 236 and 238.

[0118]In the desirable example, the cartridge contains further the flow connector 240 suitable for equipping the surroundings of the mouth 220 of a cartridge, and a closing means. The flow connector includes a cartridge connecting means like the sleeve 242 with the expanded groove 244 which is in the end for the mouth 220 and the stopper 222 which can run through, and dense mutual fitting.

[0119]The flow connector 240 includes the base 246 with which the other end 248 of the sleeve 242 was equipped. As for the base 246, it is preferred to be equipped in the sleeve 242, enabling free rotation.

[0120]The flow connector 240 contains the 1st and 2nd cannula 250,252 with which it was equipped in the base 246. The 1st and 2nd cannula contains the 1st edged end 250a and 252a that faced the stopper which can run through. Cannula contains similarly the 2nd edged end 250b and 252b prolonged to a lower part from the stopper which can run through each one in the opposite hand of the base 246. To the length of the chimney 232, cannula is parallel on parenchyma and is prolonged in the right-angled direction on parenchyma to the lid part 228 of the stopper 222 which can run through.

[0121]The flow connector 240 contains further the projecting key 254 which has been prolonged from the paired-stoppers side side of the base 246. The key groove 256 which fits in is arranged in the stopper's 222 lateral surface 224. The position of the key 254 and the key groove 256 can be made reverse natural. A key and the key groove can have the circle design divided by the radius with the center where the center of the base 246 aligned.

[0122]The 1st end 250a and 252a of cannula is prolonged in the same distance on parenchyma from the chamber confrontation side of the base 246. In a desirable example, the 2nd end 250b and 252b of cannula is arranged so that the 2nd end 252b of the 2nd cannula may be prolonged from the 1st cannula 250 from the chamber distant place side of a base to a distance.
[0123]The base 246 includes the extension wall 258 which was prolonged from the chamber distant place side, and surrounded the 1st and 2nd cannula, and is separated. The extension wall 258 includes the slot 260 formed into it. The damage to the extension wall 258 and the 2nd end 250b, a 252b nurse, or other operators is prevented, and the cap 262 provided in order to prevent contact contamination of cannula covers.
[0124]The slot 260 in the extension wall 258 serves as a key groove means for making possible suitable engagement with a socket like the socket 42 with which it was equipped into the fluid lead pipe 28 of the administration set 20 of the cartridge 208.
[0125]In an operation, a nurse or other operators remove the cap 262 from the extension wall 258, Rotate until the key 254 and the key groove 256 fit in, and an extension wall the time delay long wall 258 and base 246, Until the 1st and 2nd cannula 250,252 runs through with a closing means from the 1st position shown in drawing 19 to which hollow cannula is separated from the chamber 212 and hollow cannula moves to the 2nd position shown in drawing 20 which flows with the chamber 212 and is in a free passage, It is pushed toward the stopper 222 which can run through. In the 2nd position, the 1st cannula 250 **** a stopper's medial surface 226 in an outside point to a chimney. The 2nd cannula 252 **** the stopper 222 so that the 1st end 252a may be arranged in the chimney 232.
[0126]The cartridge 208 is inserted in the surroundings of the socket 42 shown in drawing 1 by next equipping with the slot 260 on the bridge 130 of the socket 42. In this position, the 1st and 2nd cannula 250,252 will be arranged in the socket in the same mode as the 1st and 2nd cannula 100,102 shown in drawing 9. The liquid which flows into a socket will flow into the chamber 212 through the 1st cannula 250, and will be mixed with useful ** 214 in it. The liquid will flow down the chimney to the patient through the 2nd cannula 252 and bushing 92, when a liquid goes up the level of the crowning 264 of the chimney 232. Instead, the length of the cannula 250,252 on the stopper distant place the base 246 side can be changed so that the cartridge 208 can be used with the socket 324 shown in drawing 24 and 25.
[0127]If drawing 21 thru/or 23 are referred to, in addition it includes a closing means like the stopper 270 which forms the chamber 272 with the comparatively impermeable wall 268 and it to a steam and air and which can run through with which it can run through, other cartridges 266 are indicated. The stopper 270 which can run through includes the lateral surface 276 and the medial surface 278 facing the chamber 272.
[0128]The chimney 280 will be prolonged in the right-angled direction on parenchyma to the lateral surface 276, if it puts in another way from the medial surface 278 in the parallel direction on parenchyma to the length of a cartridge. Useful ** 282 is stored in the chamber inside chimney 280 itself. The crowning 286 of the chimney 280 is equipped with the liquid permeability barrier 284 like the granular material barrier which has about 20 microns or less in a call aperture like a nylon mesh screen. The liquid permeability barrier 284 holds useful ** in the chimney 280 until the cartridge 266 is inserted into the adapter 42.
[0129]The cartridge 266 in a desirable example is provided with the flow connector 288 with the base 290. The base 290 contains chamber distant place side 292 and chamber confrontation side 294. Each

1st and 2nd cannula 296,298 is attached all over the base 290. The extension wall 300 is prolonged from chamber distant place side of base 290 292, and it has the slot 302 which makes it possible to equip with the cartridge 266 on the socket 42 in the mode indicated about other cartridges in the top.

[0130]The 1st edged end 296a of the 1st cannula 296 is prolonged from the base 290 in a distance shorter than the 1st end 298a of the 2nd hollow cannula 298. The 2nd edged end 296a of the 1st hollow cannula 296 is similarly prolonged with the aforementioned cartridge 44 from the chamber distant place side of the base 290 in a distance shorter than the 2nd hollow end 298b of the 2nd cannula 298 for use. Since it is used with a socket like the socket 324 illustrated to drawing 24, arrangement of the 2nd hollow cannula end 296b and 298b can be changed.

[0131]In use, an operator passes the stopper 270 which can run through until it contacts the stopper 270, as illustrated in chamber confrontation side 294 of the base 290 to drawing 22, and pushes the 1st and 2nd cannula 296,298.

[0132]However, it is the 1st cannula 296 that the 2nd cannula is arranged in the chimney 280 in the example which was illustrated to drawing 21 thru/or 23 unlike drawing 18 arranged in the chimney thru/or the example of 20. Since useful ** is held in the chimney, the channel to the liquid top mixed with useful ** is formed in the inside of the chimney itself.

[0133]Eventually, a liquid reaches the liquid permeability barrier 284 and flows down the paries lateralis orbitae of the chimney 280. The liquids which have useful ** in it gather into the chamber 272 of the exterior of the chimney 280. It goes up until it attains a hydraulic fluid level to the level of the 1st end 298a of the 2nd cannula 298, and then, the navel in the 2nd cannula 298 of the liquid is carried out, and it flows into the lower stream toward a patient. Wearing of the cartridge 266 containing the surrounding flow connector 288 of the socket 42 is illustrated by drawing 23.

[0134]Although some examples and the features were indicated in detail here and it was shown in the accompanying drawing, probably, it will be obvious for other various examples to be possible, without deviating from the scope of invention which carried out claim for patent.

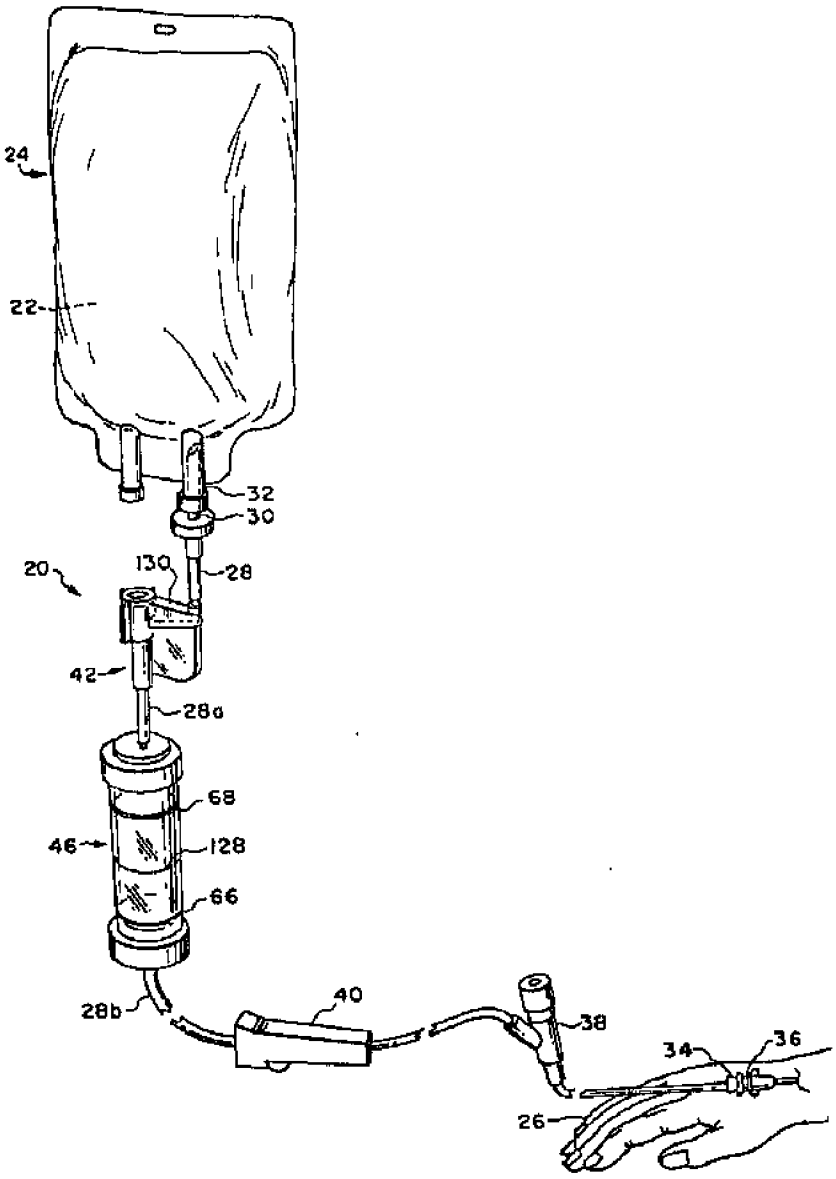
[Translation done.]

* NOTICES *

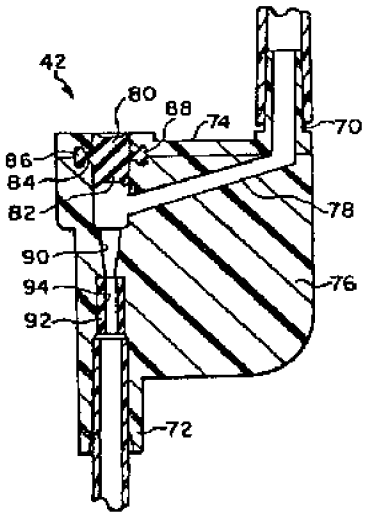
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

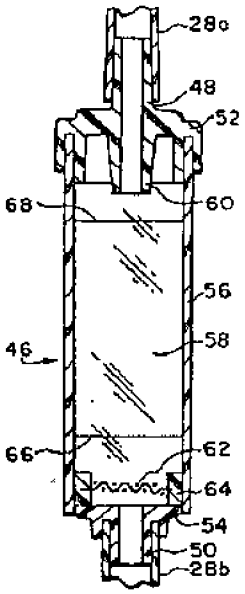
[Drawing 1]



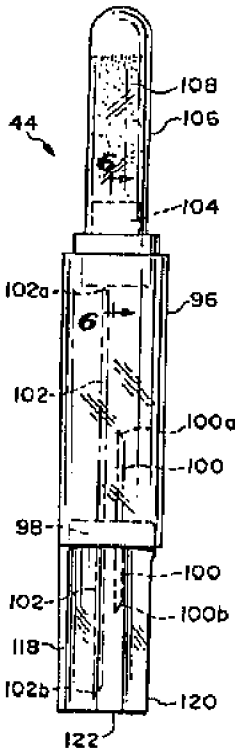
[Drawing 2]



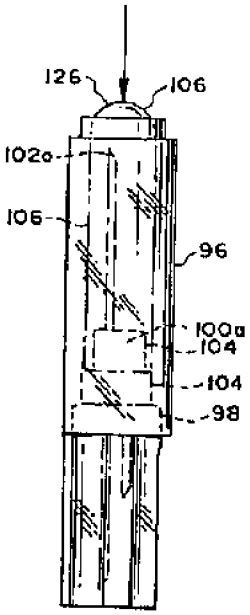
[Drawing 3]



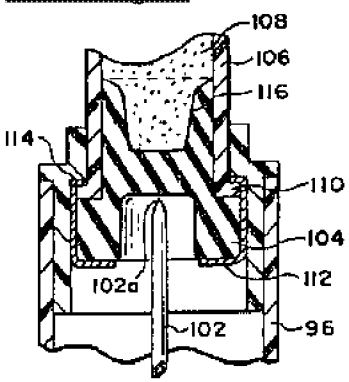
[Drawing 4]



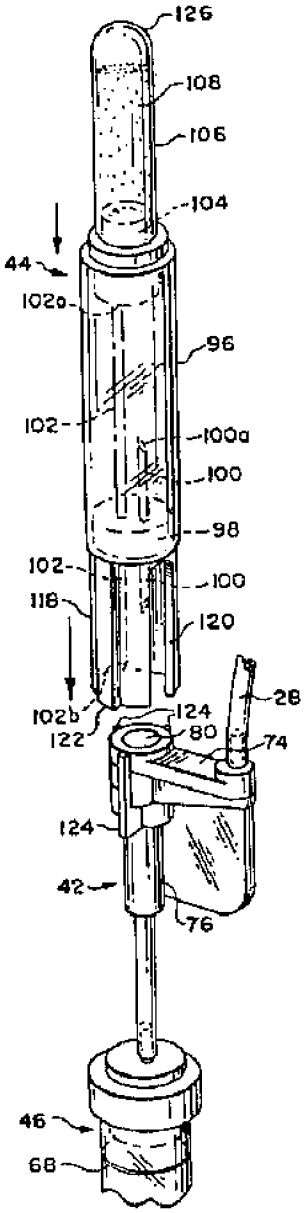
[Drawing 5]



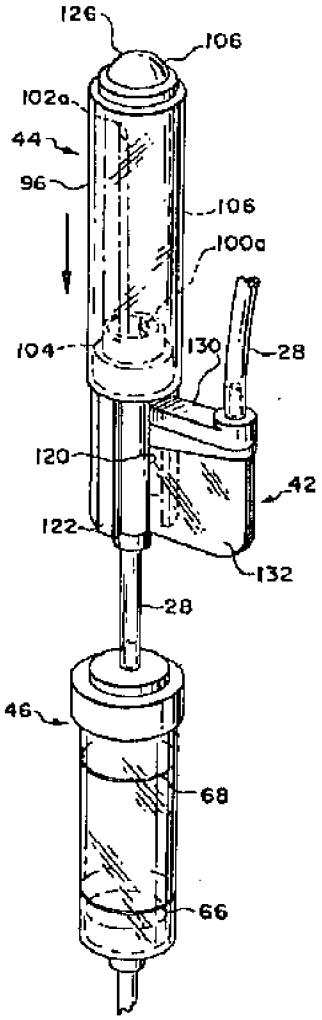
[Drawing 6]



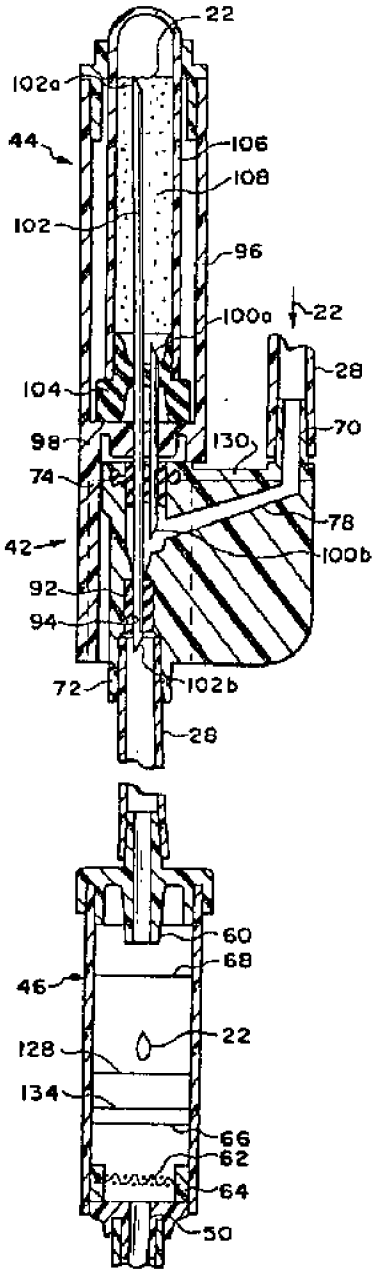
[Drawing 7]



[Drawing 8]



[Drawing 9]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44
106
108
102
96
100a
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70
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130
74
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100b
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64
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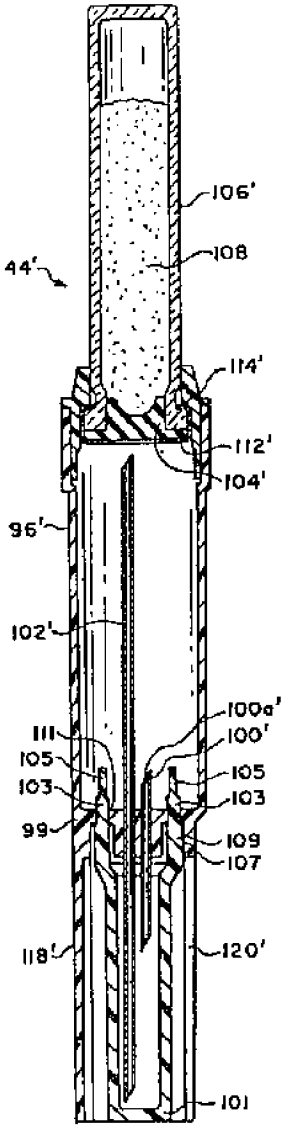
[Drawing 10]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44'
114'
112'
104'
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100a'
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109
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118'
120'
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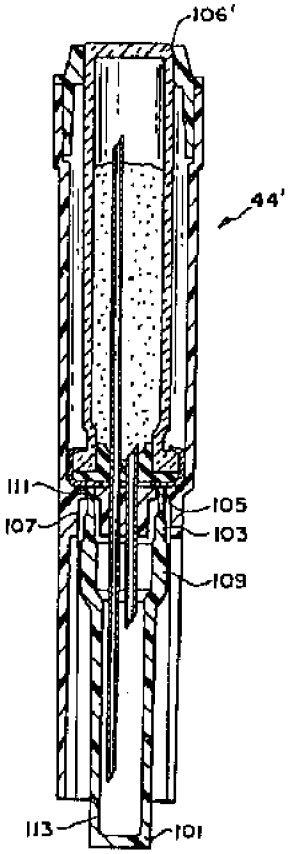
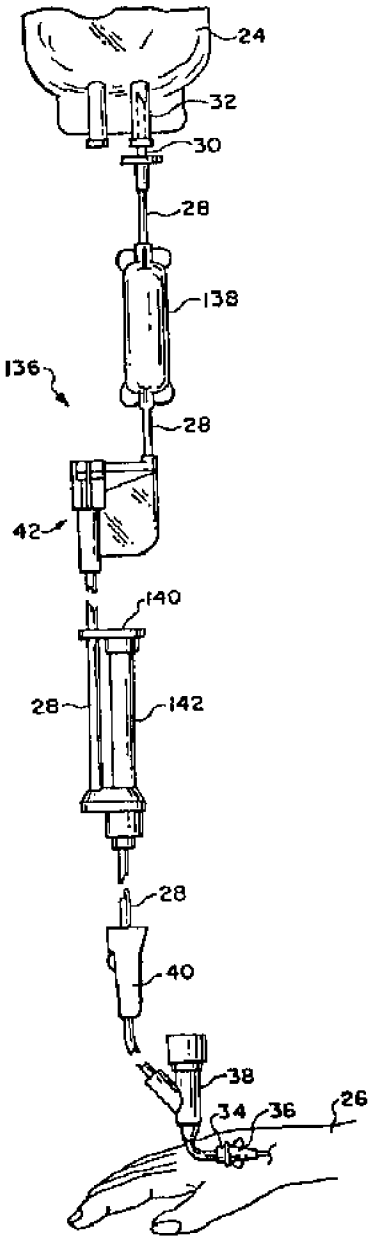
[Drawing 11]



[Drawing 12]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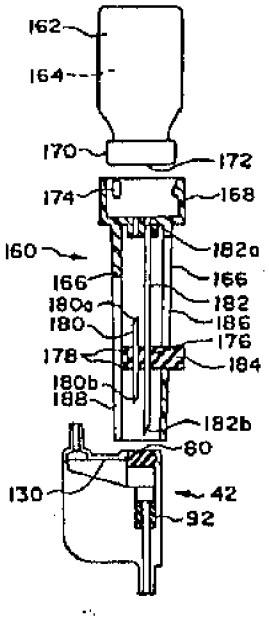
[Drawing 14]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182a
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180a
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176
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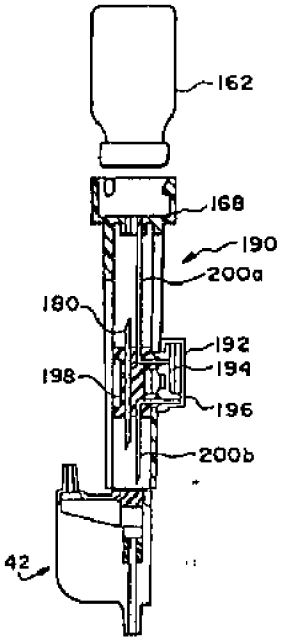
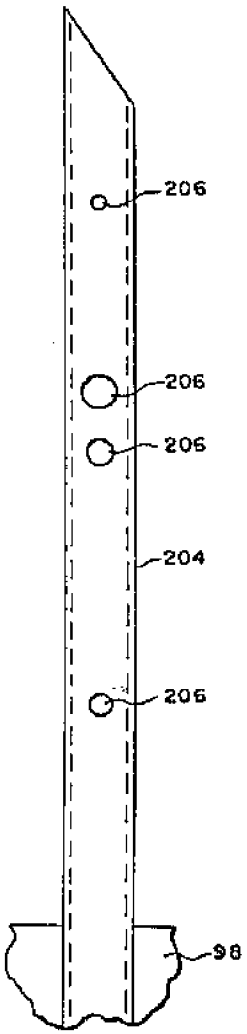
180b
188
182b
60
130
42
92

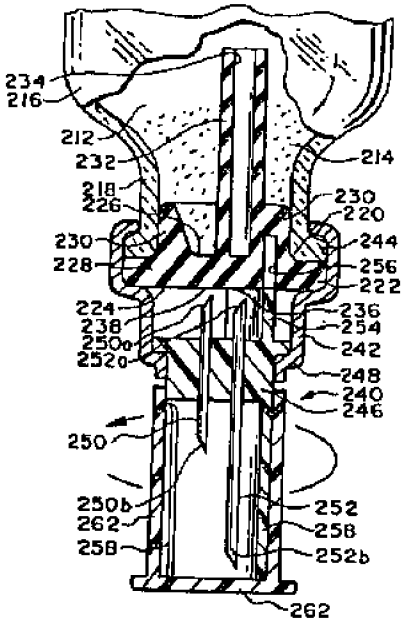
[Drawing 15]



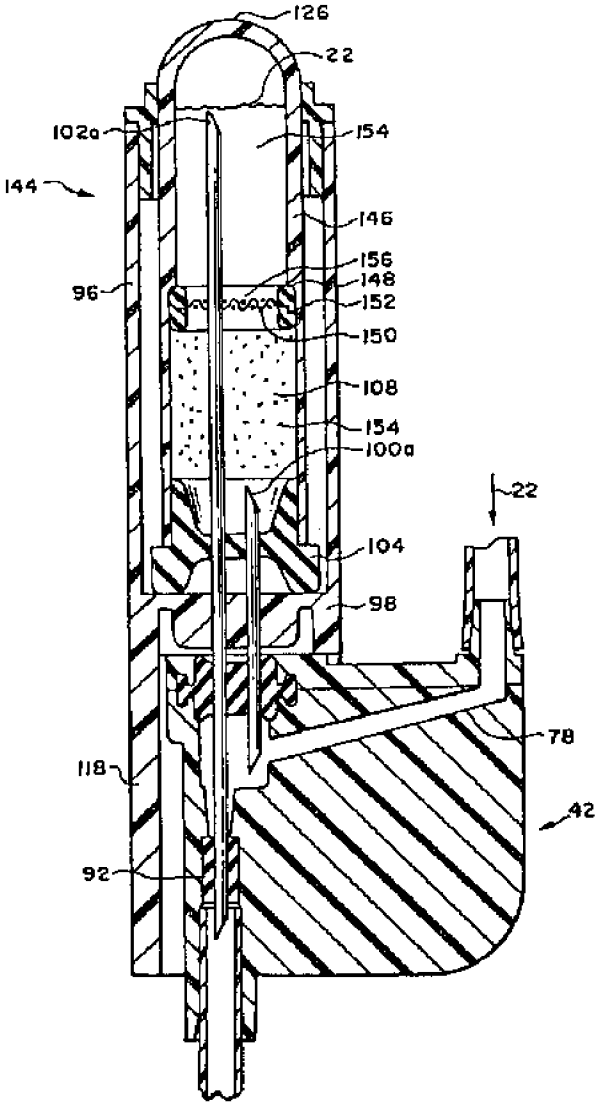
[Drawing 17]



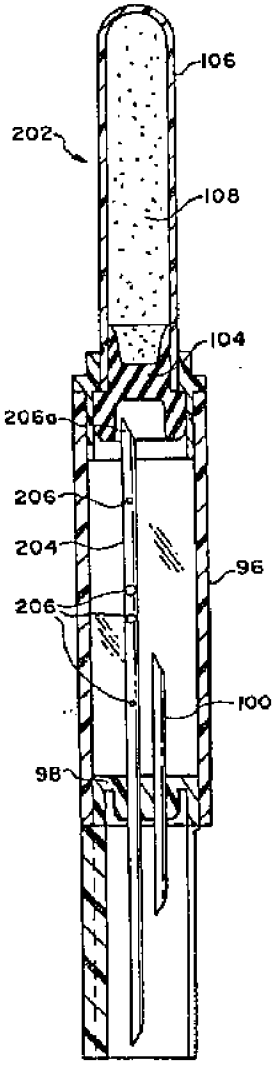
[Drawing 19]



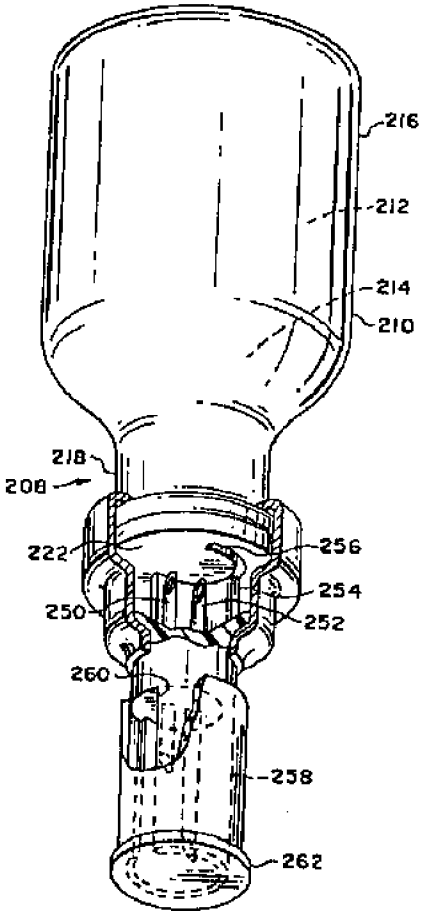
[Drawing 13]



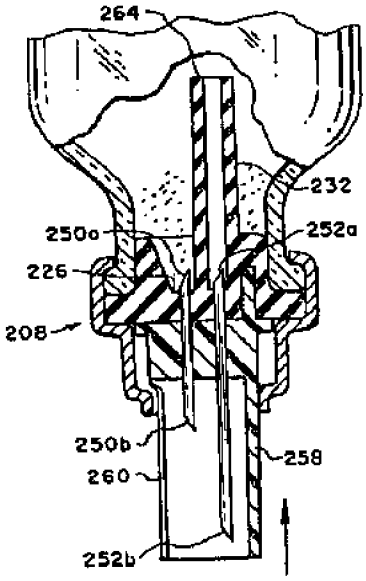
[Drawing 16]



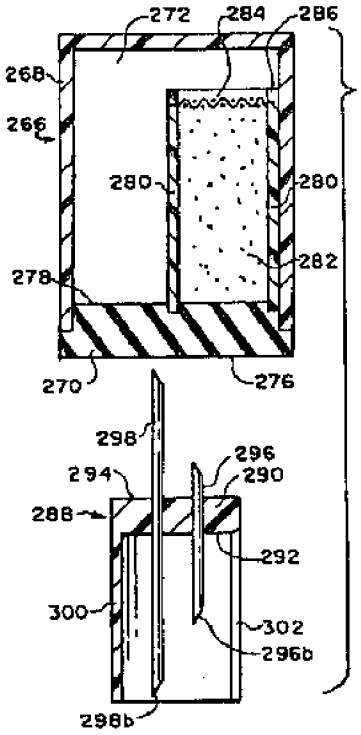
[Drawing 18]



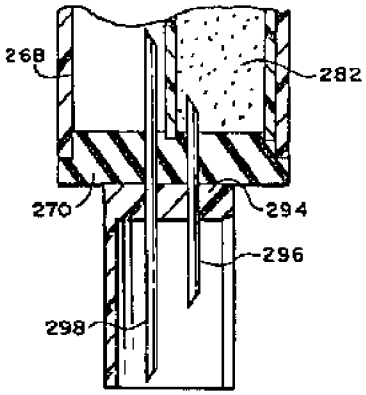
[Drawing 20]



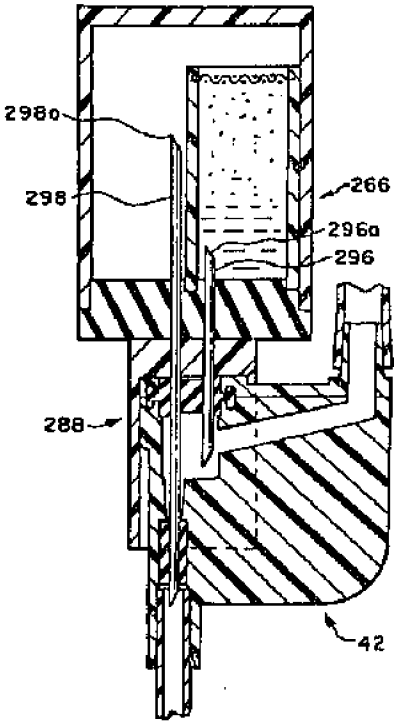
[Drawing 21]



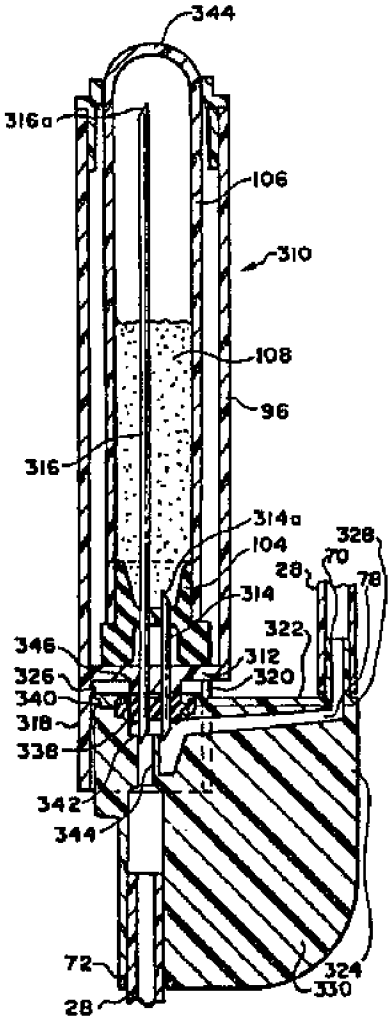
[Drawing 22]



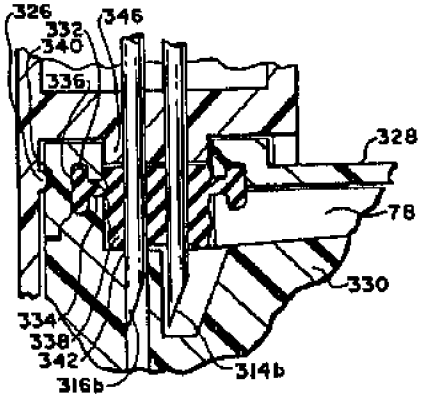
[Drawing 23]



[Drawing 24]



[Drawing 25]



[Translation done.]

* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1]A socket suitable for inserting into an administration set containing a fluid lead pipe which fits connection to a medical-application liquid source and a patient is used, (a) An entrance which is suitable for connection to an upstream section of a fluid lead pipe, an exit which is suitable for connection to a downstream part of (b) fluid lead pipe, (c) A fluid acceptance segment with a downstream end in said entrance, an upstream end in fluid communicating and said exit, and fluid communicating, (d) a part with which it can run through, and (e) -- said socket provided with a means for permitting fluid communicating between this cannula and said socket exit at the same time it isolates cannula which invades into said socket through said part with which it can run through from said fluid acceptance segment.
[Claim 2]A means (e) to isolate cannula which invades into said socket from said liquid acceptance segment, the outside of cannula which is arranged in line about said part with which it can run through downstream from said acceptance segment, and invades into a socket through said part with which it can run through -- liquid -- the socket according to claim 1 which is elasticity bushing which carries out a seal densely.
[Claim 3]A means (e) to isolate cannula which invades into said socket from said liquid acceptance segment, Counter with a part (d) with which Mr. Piston who can do elastic deformation can run through, and a part which may this piston Mr. **** in a liquid acceptance segment, and it is provided, The socket according to claim 1 constituted with an outflow seal which can form a fluid-tight seal in the surroundings of cannula which invaded into a socket by elastic deformation of this part that may piston Mr. ****.
[Claim 4]Said part with which it can run through contains a surrounding ring shape extension of a periphery of a main body portion with which it can run through, and a main body portion, Said ring shape extension has the expanded periphery edge, and said socket corresponds to said ring shape extension containing said periphery of expansion on parenchyma, and the upper part which forms an annular groove which accommodates it, and a lower part fixture are included, Therefore, Claim 1 which prevents removal of said part without said upper part and a lower part fixture catching said part with which it can run through in the meantime, and destroying said socket or a socket given in 2 or 3.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]Concerning discharge to the patient of useful drugs, technical field this invention of this invention is made safe in more detail, and relates to passive discharge of useful ** to a patient's venous system in an effective mode.
[0002]Before the drugs of a majority of background this inventions are administered intravenously to a patient, they are mixed with a diluent. A diluent may have even for example, a glucose solution, a salt solution, or water. Many of such drugs are supplied with a powder form, and are packed in a glass vial or an ampul. Although used for a chemotherapy, other drugs [like] are liquefied and are packed in a glass vial or an ampul.
[0003]A powder agent can be restored in the mode which is used in order to pour in into a vial for an injector's mixing of liquid, and inhales from a vial the solution mixed eventually and which could use the injector and was known. When drugs must be diluted before discharge to a patient, these drugs are often poured in to the back diluent container with which it was restored, and this container can be then connected to the administration set for discharge to a patient. further -- detailed -- a diluent -- a glass bottle or TORABE Norian of the Illinois DIYA field, lab RATORIZU, and yne condominium lei TEDDO -- a mini bag and Bahia -- flex time -- it is often packed in a flexible plastic bag which is sold by the name. These containers have an administration port for connecting container contents to the administration set emitted to a patient from a container. Drugs are typically added through the injection site on a container.
[0004]Drugs are packed independently [a diluent] for various Reasons. When one of the most important Reasons mixes much drugs with a diluent, it is the thing [that chemical and physical stability cannot be maintained and any substantial time periods cannot be stored for the reason]. Since the enterprise which provides the medical liquid included in the container for intravenous discharge of many companies which manufacture drugs is not undertaken, and since [its] it is opposite, drugs are often packed independently [a diluent].
[0005]So, a medical practitioner, a nurse, a pharmacist, or other medical people have to mix a diluent with drugs. This raises many problems. Restoration operation consumes time and needs aseptic technique. The operator must prepare a suitable diluent and injector before a start. A powder agent is often cake-ized at the bottom of a vial. For this reason, when a liquid is injected into a vial from an injector, the contact surface product between a liquid and a powder agent has a completely small thing at the beginning, therefore carries out mixing operation to time consumption further. It is made difficult for

the limited vial capacity that increase in a diluent and the drug concentration which goes ends a restoration process. Although it can try for an operator to solve this by injecting a solution, and mixing and attracting it into a vial repeatedly, this needs movement of an excessive injection and an injector and makes the possibility of contamination increase. The time taken for it to be sometimes difficult to take all of drugs and/or liquids out out of a vial, and to carry out restoration operation for this reason is made to increase.

[0006]Restoration operation must be preferably carried out by an aseptic condition. It is difficult for such a demand to make an operator unjust still more careful, and to often maintain an aseptic condition in addition to consuming time further. In a certain case, the laminar flow hood with which restoration operation is carried out under it may be needed.

[0007]A certain drugs like a chemotherapic drug are poisonous. During restoration, the exposure to the drugs of an operator can become dangerous, if an operator works such drugs every day and is exposed to them repeatedly.

[0008]Other problems are that restoration operation provides the source of confusion about which container has accommodated which drugs. The drugs injected to it and the name of the patient to whom it must be emitted must be marked on a diluent container.

[0009]When drugs are restored and it is inhaled into a glass syringe, in a certain case, drugs can be injected promptly to a patient's venous system. However, more typically, for connection with the intravenous administration set from an injector, the restored drugs are poured in to large solution vessels, as discussed in the top. This is because it is in such still higher concentration that the restored drugs in an injector often generate local toxicity in the vein of the patient near [with which a needle stabs the skin] the injection site. This may generate a harmful heavy vein stimulus medically. In addition, the proper dose of medication is contained in the injector, however instant injection into a patient's blood flow may generate the state of such high systemic toxicity that the drug concentration level in the whole patient blood style is dangerous.

[0010]One of the Reasons of still others which are not directly injected from an injector to a patient is that it makes a patient generate the excessive injection site which is painful for a patient and provides other opportunities to infection.

[0011]The restored drugs are more typically injected into a diluent container for these Reasons.

[0012]A patient can be medicated with glucose or the salt solution emitted through an administration set like TORABE Norian and the CONTINUFLO administration set currently sold from lab RATORIZU from a typical for example, large capacity parenteral container like 1L container. Supposing restoration drugs are injected into a mass parenteral container, discharge of drugs will be emitted over time to be usually too long. These mass fluid is often emitted by a very late flow.

[0013]The restored drugs are injected still more typically into a small capacity parenteral container like TORABE Norian and the 50-ml container currently sold by lab RATORIZU. This mini bag container is hung by the altitude higher than a mass parenteral container, and is connected to the injection site on a primary administration set by the secondary administration set. Since [that it is higher] it is maintained highly, after the restoration drugs in a small capacity container are emitted, the fluid from a mass container begins to flow through it once again.

[0014]United States patent No. 4,410,321 by which all the closed restoration discharge systems were transferred to the grantee of this invention; 4,411,662; It is indicated by 4,432,755 and 4,458,733. A container contains drugs and a diluent in a separate compartment, and before drugs are emitted to a

patient, in a closed system, they are restored, as shown there. Typically, this container is connected to the administration set connected in the other end of a primary administration set which had the small capacity parenteral container discussed in the top. The container shown in these patents solves many of problems relevant to injector restoration. However, this product needs a series of restoration steps which must be carried out before a nurse or other operators emit a fluid from a container.

[0015]In the mode which does not need the restoration step by an operator, discharge of drugs or other useful **, ARUZA of Palo Alto, California, United States patent No. 4,424,056 transferred to condominium ration; 4,432,756; 4,439,183; 4,474,574; 4,479,793; It is shown in 4,479,794 and Canada patent No. 1,173,795. The parenteral discharge system which has a formulation room for prescribing useful ** like drugs for the patient in it is indicated as indicated by these patents. In providing restoration of drugs by flowing fluid, for example from a mass parenteral container through an administration set including the formulation room which has drugs in it, this system is advantageous. This system seems to mean eliminating the necessity for restoration operation of consuming the above mentioned time, and to eliminate the problem relevant to restoration operation.

[0016]other passive restoration systems -- AKUCHIE of Sweden -- bora -- it is indicated by European Patent No. 0059694 of get and hustle.

[0017]The instrument of still others for being in-line, namely, emitting drugs in an administration set is indicated by Australia patent No. 15762 / 83 transferred to the tiba of Switzerland, Guy Gee, and AGE, and corresponding European Patent No. 0100296. This instrument holds drugs and includes the section through which a liquid passes to the general trend through which a liquid flows into a patient, and a parenchyma top counter direction.

[0018]In addition it is going to provide in-line drugs restoration, other systems are shown without restoration by the nurse or the help by other operators in United States patent No. 4,465,471 transferred to and [IRAI of State Indianapolis of Indiana, a lily], and a company. This patent indicates the structure for the socket in the administration set itself. Another cartridge which accommodated the drugs which should be restored and should be emitted to a patient is packed into this container. When a liquid comes out of a cartridge and a container restoration and after that [of drugs] and invades into a cartridge for discharge to a patient, most most [parts or] continue flowing through an administration set, and they bypass a cartridge thoroughly.

[0019]And [IRAI, a lily,], the Europe patent application ****** of a company Including a vein administration set and a drugs vial, No. 0146310 is related with the system for the drugs restoration using a vial vacuum, in order to restore drugs.

[0020]U.S. Pat. No. 4,534,758 of AKAZU and others indicates the comparatively complicated drugs discharge system provided with various kinds of valves. When the liquid from a container is emitted into a drugs vial, a vial is stirred sufficient time to suspend dry drugs before.

[0021]The eye back of San Diego, California, and U.S. Pat. No. 4,581,614 of Millard and others transferred to condominium ration indicate the selector valve for emitting the drugs beforehand restored to the patient through the intravenous administration set from the drugs vial.

[0022]All the announcements indicated above are turned to the solution to the problem relevant to the restoration operation and it which consume time. In most proposed solution, it has intention of discharge of drugs being passive, i.e., once it is put into drugs into an administration set, do not need the restoration step by a help. Other common features of the tried solution which was indicated during these announcements having discharge of drugs possible for the fluid flow rate to a patient in an unrelated

mode on parenchyma through an administration set is having intention. These systems are designed emit a dose with drugs to within a time [beforehand selected] within a wide range fluid flow rate if the another better one is carried out. Although it changes with drugs and doses, discharge of drugs unrelated to a flow is preferred in order to ensure that a dose required for within a time [which are about 20 thru/ or 30 minutes typically / which can be permitted remedially] is emitted.

[0023]By making discharge of drugs and other useful ** unrelated to a flow, a system ensures that drugs will not be quickly emitted too much even if a flow is highly set too much by the nurse or other operators, and prevents the problem of the systemic toxicity discussed in the top.

[0024]United States patent No.4,424,056; The thing with document like 4,479,793; and 4,479,794, ** is mixed after all, it has useful ** arranged in the administration set for emitting to a patient in-line one, and discharge of ** is turned to the system which can be carried out to the capacity to which the fluid was given. The valve which controls a fluid stream can operate with a help so that ** may be emitted in the mode which can be dependent on a fluid stream.

[0025]The system (namely, thing which does not carry out necessity for another stirring or mixing step) of the automatic-reinstatement type discussed at least in the top wears a possibility that the concentration of useful ** in the liquid emitted to a patient will become high too much in a low flow. This generates local toxicity to a patient [near the introduction point to the inside of the body]. ********** entitled "the drugs ejecting device which prevent a part and systemic toxicity" with which it applied for this problem on December 3, 1984 of Thomas, E, and the need hams which were transferred to the grantee of this invention Invention indicated by No. 721,999 is solved. Other solution over passive mixing of useful **, and the problem of discharge to a patient, Brian, ********** entitled "the housing which enables passive mixing with useful ** and diluent" of ZUDEBU and others for which it applied on December 3, 1984 transferred to the grantee of this invention after all It is indicated to No. 721,991. This application Naka has disclosed some housing structures for emitting useful ** to a patient. Typically, housing contains the cartridge of the different body which contains in the medical-application liquid administration set the socket arranged in-line one and useful **. It is inserted in a socket when it wishes that a cartridge will emit useful ** to a patient. The positive restoration by the nurse or other operators is not needed. Instead, once a cartridge is inserted in a socket, the liquid which flows from a medical-application dietary source of liquid through an administration set will flow into a socket and a drugs content cartridge, and will restore drugs. The solution which had drugs in it flows through an administration set into a patient's venous system from a socket in the lower stream.

[0026]Probably, it will be desirable to have an administration set suitable for passive mixing of useful drugs and discharge to a patient which does not need outside environment and a free passage at all.

[0027]Probably, it will be desirable to have the structure of the socket in the administration set which can manufacture easily and permits attachment of a cartridge simply and effectively to it. Probably, it will be desirable to provide the socket which ensures that the liquid which flows into a socket flows without the leakage which bypasses a cartridge through a cartridge.

[0028]Probably, it will be desirable to provide the socket which contains at least the improved thrusting part which can be equal to repetitive insertion and removal of one or more of cannula between the intermittent periodic duties of two or more cartridges in the socket single without the possibility of careless removal of the part with which it can run through.

[0029]Probably cost will be cheap, probably manufacture will be easy and it will be desirable to have a cartridge which accommodates useful ** of a design which provides easy quick and suitable alignment

wearing on a socket.
[0030]Probably, it will be desirable to change the drug concentration which the liquid which flows a cartridge into the lower stream toward a patient about the given cartridge design selected beforehand.
[0031]Probably, it will be desirable to provide the cartridge which accommodates useful ** which ensures a suitable fluid passage for a cartridge design to emit a suitable quantity and concentration of drugs to a patient.
[0032]Outline this invention of this invention eliminates the manual step which the time required for restoration of drugs or other useful ** requires. This invention emits a medical-application solution to a patient, and provides improvement of an administration set suitable for accommodating the cartridge of the improved design which accommodates useful **. In one example, an administration set is unnecessary at all in connection of a cartridge and an air outlet to a socket, permits exclusion of the air from [from the inside of a cartridge] after, and forms the system closed thoroughly.
[0033]in one desirable example -- an administration set -- a medical-application liquid source -- and the fluid lead pipe which includes the upper stream and the downstream connecting means for connection to the patient's venous system, respectively is included. The socket for accommodating the cartridge containing useful ** is attached along with a fluid lead pipe. the liquid which flows through a socket when installing a cartridge to a socket -- all flow through a cartridge in part preferably at least. The administration set contains the air flask for having an entrance and an exit downstream from a socket, and holding some air in it further. When a cartridge is inserted in into a socket, it fills up with a cartridge automatically with the liquid which flows into a socket. Although the air in a cartridge flows into an air flask downstream, it does not flow into a patient downstream any more.
[0034]In the desirable example, all the liquids in which an air flask flows into the lower stream toward a patient contain the granular material barrier which must flow through the barrier concerned and which serves as a filter which removes all the particles in a liquid.
[0035]The administration set of this invention includes the minimum on an air flask which provides the operation of an administration set in the right hydraulic fluid level in an air flask, and the highest hydraulic fluid level directions.
[0036]It may have bacteria inhibition air exhaust openings downstream from said socket or a cartridge chamber into said liquid lead pipe instead of an air flask. The entrance and exit where the socket was suitable for connection to the upper stream and the downstream part of the fluid lead pipe, about the thrusting part run through with two cannula of a cartridge, one outside of the cannula which is related at least with a thrusting part, and is put in order, therefore passes at least along a thrusting part, and invades into a socket, and liquid -- elasticity bushing in the socket engaged densely is included. It forces that a socket flows through it in this mode first when the cartridge containing ** with all the useful liquids emitted to a patient is connected to a socket.
[0037]The cartridge includes the closing means for closing the chamber for useful **, and this chamber with which it can run through preferably. A cartridge is attached on a socket and the adapter means for providing the alternative fluid communicating between a socket and a chamber is attached to the surroundings of a chamber.
[0038]This adapter means includes further the passage means containing the chamber and the socket **** means. This passage means includes the exit passage other than a chamber in the entrance road in a chamber, and according to.
[0039]A chamber and the adapter passage means can run through with a chamber selectively by a

chamber **** means, and they can slide it freely relatively so that it may put on the free passage which opened the chamber inlet passage and the exit passage by it.
[0040]A chamber **** means actually runs through with a chamber, when a cartridge **** means runs through with a cartridge, an entrance and an outlet passage extend into a chamber each one, and a cartridge is designed so that an outlet passage may be arranged at an altitude higher than an inlet passage. It helps to prevent the drugs of high concentration, so that it is dangerous from this producing effective mixing with the liquid in a chamber, and useful **, and being emitted to a patient. The base plate which the cartridge crossed an upright cylinder and this upright cylinder, and was attached in the desirable example, And this base plate is passed, it is attached and the 1st of a base plate prolonged inside the upright cylinder in one side at least and the 2nd hollow cannula are included in the upright cylinder and the direction of the parenchyma top same axle.
[0041]In the both sides of a base plate, it has extended each one of hollow cannula. It **** each one like [both] the thrusting part of the stopper which has closed the tube shape chamber in which both cannula has accommodated useful drugs and which can run through, and a cartridge accommodation socket, including [therefore] the 1st and 2nd edged ends. The 1st hollow cannula is shorter than the 2nd cannula in the both sides of a base plate. It is equipped with the tube shape chamber containing useful drugs in an upright cylinder, enabling a free slide. A tube shape chamber can be slid to the 2nd position that ran through with the stopper with which both 1st and 2nd cannula can run through from the 1st position with which the stopper is not run through with hollow cannula.
[0042]** with a cartridge chamber useful in other one example of this invention -- the barrier concerned -- and the granular material barrier held between chamber closing implements is included. When the 2nd longer outlet passage means is inserted into a cartridge chamber, a granular material barrier is ****(ed).
[0043]Reference of the detailed explanatory view 1 illustrates the administration set 20 for emitting the medical-application liquid 22 stored in a medical-application liquid source like the mass parenteral liquid container 24 to the patient 26. The administration set 20 contains the fluid lead pipe 28 made from the flexible poly chloridation polyvinyl chloride tube. An upper connecting means like the standard intravenous administration set spike 30 is attached to the upstream end of the fluid lead pipe 28. The spike is suitable for ****(ing) the film of the container administration port 32.
[0044]The fluid lead pipe 28 includes a downstream connecting means like the RUA taper 34 with which the downstream end of the fluid lead pipe 28 was equipped. The RUA taper 34 is connectable with the catheterization of vein 36 according to standard technology.
[0045]The administration set 20 can include further the standard injection site 38 for pouring in a medical-application liquid with a needle through the injection site 38 with which it can run through. The administration set 20 can include further a flow control means like the standard roller clamp 40 with which the surroundings of the flow lead pipe 28 were equipped.
[0046]The administration set 20 contains further the peculiar socket 42 shown in drawing 2 in detail. ********** which applied for the socket 42 on December 3, 1984 It is improvement of the socket currently indicated by No. 721,991. It is equipped with the socket 42 along with a fluid lead pipe, and it is suitable for accommodating the cartridge 44 of the different body shown in drawing 4 thru/or drawing 9, and drawing 10 which have accommodated useful **. When equipped with a cartridge on a socket, all liquid flows through a cartridge in part preferably at least, before being sent in the lower stream toward a patient from the medical-application dietary-source-of-liquid container 24 which flows into the socket 42 through the fluid lead pipe 28 out of a socket.

[0047]Drawing 1 and the air flask 46 shown in 3, 7, 8, and 9 are downstream from the socket 42. When equipping up to the socket 42 of the administration set 20 with a cartridge, the air flask 46 permits automatic priming of the cartridge 44, so that it may explain in detail later. This air is prevented from the air flask 46 absorbing the air arranged in the cartridge 44, and passing it to the lower stream toward a patient.
[0048]If drawing 3 is referred to, the upper fluid lead pipe 28a is equipped with the air flask 46, and it includes the entrance 48 which receives a fluid from it. The downstream fluid lead pipe 28b is equipped with the air flask 46, and it includes the exit 50 which shifts to it. The fluid lead pipe 28 can be equipped with an entrance and an exit by interference fitting, solvent bonding, etc. The lower stream of the socket 42 is equipped with an air flask.
[0049]In a desirable example, as for the air flask 46, it is equipped with the cylindrical shape side attachment wall 56 of a desirable optically transparent flexible material like polyvinyl chloride between them, including respectively an entrance and the port end caps 52 and 54. The liquid included in the air chamber 58 falls toward the exit 50 from the droplet formation orifice 60 which the side attachment wall 56 and the end caps 52 and 54 formed the air chamber 58 which has larger sectional diameters than the inside diameter of the fluid lead pipe 28, therefore adjoined the entrance 48. For this reason, the air flask 46 provides the collecting container of the air in the administration set 20.
[0050]The air flask 46 contains further the granular material barrier 62 like the granular material screen with which it was equipped in the about 50-exit plastic rings 64. The sterilization filter which has about 0.2 micron in a call aperture actually may be sufficient as a granular material barrier. A call aperture may be larger like the large drop-like thing barrier which has about 20 microns in a call aperture. In a desirable example, a call aperture is about 10 microns. Nylon mesh material which is supplied by the filter of Hebron, Illinois, and the tech may be sufficient as a screen. It is horizontally equipped with the granular material barrier 62 to a channel so that all the liquids which pass the air flask 46 may pass the granular material barrier 62.
[0051]Although it is not necessary to arrange the granular material barrier 62 in the air flask 46, it must be equipped with a barrier downstream from a socket so that all the liquids which come out of the inserted cartridge may pass a granular material barrier. It is not separated by the upper fluid lead pipe 28a, for example, but the socket 42, the air flask 46, and the granular material barrier 62 can also be constituted as a single unit.
[0052]In a desirable example, as for the air flask 46, they can consist of a surrounding line of the periphery of the air flask 46 including the minimum hydraulic fluid level directions 66 and the highest hydraulic fluid level directions 68. Preferably, the hydraulic fluid levels in the air flask 46 must be somewhere in minimum and middle highest hydraulic fluid level directions, just before inserting into the socket 42 of the cartridge 44.
[0053]The improved socket 42 includes the socket entrance 70 and the socket exit 72 which were connected to the fluid lead pipe 28. The air flask 46 is arranged downstream from the socket exit 72.
[0054]The socket 42 contains the upper part and each of lower part fixtures 74 and 76. The lower part fixture 76 contains the fluid acceptance segment 78 with the downstream end in the upstream end and the exit 72 in the exit 72 and the entrance 70, and fluid communicating, and fluid communicating.
[0055]It is equipped with the part 80 with which it can run through in a socket, and it is caught between the upper part and the lower part fixture 74 and 76. The part 80 with which it can run through contains the ring shape extension 84 prolonged in the surroundings of the periphery of the main body portion 82

with which it can run through, and the main body portion 82. The ring shape extension 84 includes the expansion periphery further.

[0056]The upper part and the lower part fixtures 74 and 76 are both, are equivalent to the ring shape extension 84 include the expansion periphery 86 on parenchyma, and form the annular groove which accommodates it so that the part 80 with which the upper part and a lower part fixture can run through between them may be caught in an adherence mode. The part 80 is unremovable without decomposing the socket 42. The upper part and the lower part fixtures 74 and 76 are joinable by adhesives, an ultrasonic ceiling, etc. Since two or more KASHITO ridges 44 which have two **** cannula each one between the usable lives of the socket 42 and the administration set 20 are inserted repeatedly and drawn out from a part, being maintained firmly is important for this part in a socket. Generally the fluid acceptance segment 78 contains the same axle tapered portion 90 with it under the part 80 with which it can run through. The tapered portion 90 serves as needle guides to the inside of the elasticity bushing 92.

[0057]Elasticity bushing is built with a desirable elastomer like polyisoprene. The elasticity bushing 92 forms the narrow penetration boa 94. About the part 80 with which it can run through, the elasticity bushing 92 is located in a line, and is arranged, therefore the penetration boas 94 are the tapered portion 90 and the parenchyma top same axle.

[0058]If it changes to drawing 4 thru/or 9, the cartridge 44 for introducing drugs or other useful ** into the fluid lead pipe 28 in the socket 42 for discharge of this ** to a patient is illustrated.

[0059]The cartridge 44 contains the base plate 98 which crosses the upright cylinder 96 and an upright cylinder and with which it is equipped. It was equipped with each 1st and 2nd hollow cannula 100,102 through the base plate 98, and even if there are few base plates 98, in one side, it has extended to the inside in the upright cylinder 96 and the real Kamihira line. It has extended on both sides of the base plate 98 each one of the hollow cannula 100,102. The 1st hollow cannula 100 contains the 1st edged end 100a suitable for ****(ing) the stopper 104 which can run through. 1st hollow KANYURE 100 contains the 2nd edged end 100b reversely [of the 1st edged end 100a] again. Similarly, the 2nd hollow cannula 102 contains the 1st edged end 102a suitable for ****(ing) the stopper 104 which can run through. 2nd hollow KANIRE 102 contains the 2nd edged end 102b in the opposite hand of the edged end 102a again. The 2nd hollow cannula 102 is prolonged in a long distance in the both sides from the base plate rather than the 1st hollow cannula 100.

[0060]Although the cartridge 44 contains further the tube shape chamber 106 which has accommodated useful ** 108 like the dry powder agent, a liquid may be sufficient as this **. The stopper 104 or other closing means which were expressed above and with which it can run through close the tube shape chamber 106.

[0061]Reference of drawing 6 will equip with the stopper 104 which can run through in the mouth 110 of the tube shape chamber 106. The stopper 104 made of rubber can adhere in a tube shape chamber in the mode which was similar to adherence of the stopper of a standard drugs vial with the surrounding metal band 112 of the mouth 110 and the stopper's 104 periphery. It is equipped with the tube shape chamber 106 in the upright cylinder 96, enabling a free slide so that the stopper 104 may meet the base plate 98. The tube shape chamber 106 is maintained at the perfect engagement from the cylinder 96 by the tongue 114 prolonged from the upright cylinder 96. The tongue 114 engages with stopper 104 and metal band 112 assembly prolonged outside from the side attachment wall of the tube shape chamber 106 so that it may illustrate to drawing 6. The stopper 104 which can run through can include the diameter space 116 of a cone facing the inside of the chamber 106. Instead of the stopper which can run

through, other closing means with which it can run through can be established.
[0062]When the cartridge 44 is in drawing 4 and the 1st position shown in 6 and 7, the stopper 104 made of rubber is run through by neither of the 1st or 2nd hollow cannula 100,102. In a desirable example, the stopper 104 which can run through continues being separated from the 1st and 2nd cannula 100,102, when the tube shape chamber 106 is in the 1st position.
[0063]The 1st and 2nd cannula 100,102 constitutes a passage means. The 1st short hollow cannula 100 provides the entrance road to the inside of the tube shape chamber 106. The 2nd long cannula 102 provides the exit passage from the chamber 106. A passage means forms a part of adapter means suitable for equipping with the cartridge 44 on the socket 42 containing an upright cylinder. An adapter means is slid about the chamber 106. The hollow cannula 100,102 can slide the inside of the upright cylinder 96 so that other examples may see later. If it puts in another way, the tube shape chamber 106 and an adapter means can be selectively slid about mutual.
[0064]An adapter means can be prolonged from the base-plate 98 side opposite to the chamber 106, and can contain the key groove means of it and the same axle further on parenchyma. The key groove means can include the comparatively upright key groove wall 118 include the key groove slot 120 for fitting in on the socket 42. The key groove wall 118 can contain the groove 122 formed in 1 or two length or more for the corresponding vertical key 124 with which the outside of the socket 42 was equipped again, and engagement. A key groove means ensures suitable engagement with the socket 42 with which the cartridge 44 is related, including suitable arrangement of the 1st in a socket, and the 2nd hollow cannula 100,102.
[0065]The chamber 106 of the cartridge 44 until the stopper 104 which can run through contacts to the base plate 98 which serves as a stop from the 1st position shown in drawing 4, It can slide to the 2nd position shown in drawing 5 obtained by pushing the chamber 106 below within the upright cylinder 96. In this position, the 1st and 2nd cannula 100 and 102 has run through with the stopper 104 which can run through, therefore the edged hollow ends 100a and 102a of the 1st and 2nd cannula 100 and 102 are in chamber 106 inside and a free passage. The end 102a of the 2nd cannula 102 is in the deep inside of the tube shape chamber 106, and is near the apex 126 of the chamber 106 preferably. The edged hollow end 100a of the 1st cannula 100 is in the tube shape chamber 106 exactly preferably like [in a part for the hollow circle cone-shaped part 116 formed by the stopper 104].
[0066]In an operation, before useful ** 108 in a cartridge is emitted to a patient, the administration set 20 of this invention operates by establishing the fluid channel opened between the medical-application liquid container 24 and the patient 26 so that it might illustrate to drawing 1. The liquid 22 flows through the administration port 32 and the spike 30 from the container 24. A liquid passes along the fluid lead pipe 28, and flows into the order through the socket 42 through the socket entrance 70, the fluid acceptance segment 78, the tapered portion 90, the penetration boa 94, and the exit 72. A liquid passes along the connection lead pipe 28, and flows into the air flask 46 through the droplet formation implement 60. Air accumulates in the air flask 46, and a liquid passes along the flask exit 50, passes along the downstream conduit part 28b, and continues flowing into a patient through the RUA connector 34 and the catheterization of vein 36 in the lower stream.
[0067]Before the administration set 20 is put on the patient 26 and a free passage, priming of the fluid lead pipe 28 is carried out, namely, air is eliminated. By permitting that a liquid flows through a set, this is carried out in a known mode, before connecting with a patient.
[0068]Since the level 128 in the air flask 46 raises a hydraulic fluid level so that a hydraulic fluid level

may come between the minimum and the highest index lines 66 and 68, in a standard mode, the air flask side attachment wall 56 can be suppressed like most dropping rooms, and can be released.

[0069]When it desires to emit useful ** 108 like drugs to a patient, it is equipped with the cartridge 44 which has ** 108 useful in it in it on the socket 42. Drawing 7 illustrates the cartridge 44 and the socket 42 before being equipped before the operation of a cartridge, and with it on a socket.

[0070]The cartridge 44 is provided in the state where the chamber 106 is in the 1st position to a nurse or medical people, as shown in drawing 4 and 7. The cartridge 44 only grasps the upright cylinder 96, and operates by pushing the crowning 126 of the chamber 106 below with the thumb. This is first stuffed into the 2nd cannula end 102a and the next through the stopper 104 which can run through with the 1st cannula end 100a. The tube shape chamber 106 is pushed below until it is restricted by contact with the closing implement 104 and the base plate 98 with which movement beyond it can run through. This 2nd position is illustrated by drawing 5.

[0071]It is equipped with the cartridge 44 which now is in the 2nd position on the socket 42 so that it may next illustrate to drawing 8. It is important that the 1st and 2nd cannula 100,102 is arranged in the specified position in a socket. With the key groove wall 118 which has the key groove slot 120 in it, this. the slot 120 is guided in the bridge 130 top of the upper part fixture 74 on the socket 42 -- it is provided more and provided by the groove 122 formed in the length in the key groove wall 118 which fits in on two or more vertical keys 124 with which the surroundings of the socket 42 were equipped further. In the illustrated desirable example, the key groove wall 118 contains the three vertical keys 124 on a socket, and the three formed grooves 122 fit in.

[0072]In [if drawing 9 is referred to] the handle 132 the cartridge 44 single hand the socket 42, and -- grasping the upright cylinder 96 by the hand of another side -- and the 2nd end 102b of the 2nd cannula -- and the thing for which the cartridge 44 is pushed below so that the 2nd end 100b of the 1st cannula short next may **** the main body portion 82 of the part 80 which can run through with both -- more, It is easily equipped on the socket 42 at the mode shown in drawing 8. the cartridge 44 continues being pushed below, therefore the 2nd hollow cannula 102 goes into the penetration boa 94 -- and the surroundings of the periphery of the 2nd hollow cannula 102 -- the bushing 92 -- liquid -- engagement is carried out densely. The base plate 98 contacts the crowning of the fixture 74, and suitable wearing occurs, after restricting downward movement beyond it of the cartridge 44.

[0073]As shown in drawing 9, when the cartridge 44 and the socket 42 are engaged, the liquid 22 which flows into a socket at the entrance 70 flows through the fluid acceptance segment 78. The elasticity bushing 92 is carrying out the seal of the surroundings of the 2nd hollow cannula 102, and the liquid 22 prevents passing to the lower stream directly. Instead, the liquid 22 goes into the 2nd end 100b of the 1st cannula 100, and goes into the tube shape chamber 106 in the 1st end 100a of cannula.

[0074]When the liquid 22 goes up within the chamber 106, the residual air in the chamber 106 is extruded through the 2nd cannula 102 in the lower stream. Air goes into the air flask 46 through the droplet formation machine 60, and accumulates in the flask 46. The first hydraulic fluid level 128 illustrated to drawing 1 descends to a new level to which it pointed by the line 134. The hydraulic fluid level 128 so that air may be caught and the hydraulic fluid level in the air flask 46 may not descend to the flask exit 50 by which it may be washed away toward a patient in the lower stream, when air leaves the cartridge 44, Before insertion into the administration set 20 of the cartridge 44, it must be above the minimum hydraulic fluid level directions line. Although the hydraulic fluid level after priming of the

cartridge 44 may be below the minimum hydraulic fluid level 66, if it is above the minimum line 66, the hydraulic fluid level 134 will never become before insertion of the cartridge 44 lower than the exit 50.
[0075]The highest hydraulic fluid level directions 68 serve as a guide for the highest hydraulic fluid level which the droplet which goes into the air flask 46 through the droplet formation machine 60 can count in addition in a standard mode.
[0076]It continues going up until the hydraulic fluid level in the tube shape chamber 106 reaches the edged end 102a of the hollow of the 2nd cannula, Then, the liquid 22 passes along the 2nd cannula 102, and begins to flow out of the chamber 106 into the air flask 46 through the lower stream and the droplet formation implement 60 through the 2nd end 102b. The liquid which leaves the chamber 106 has the suitable concentration of useful ** 108 mixed with it for discharge to a patient. The upper part liquid passage formed in the chamber 106 with the 1st and 2nd cannula 100,102 forms a density gradient within the chamber 106 so that as highly as the drug concentration in the liquid 22 left in the cannula end 102a generates the local toxicity to a patient. Local toxicity is in the situation which a vein stimulus may generate near the intravenous injection part, when the drug concentration of the effluent inside of the body is too high.
[0077]Generally the drugs burst size to a patient is unrelated to this flow in a typical liquid flow rate per unit time. The total amount of the drugs emitted to a patient per unit time as used in the flow in which this is very high means not being so high as systemic toxicity being generated to a patient. If it puts in another way, the patient will not be introduced into within a time [too much short] in the drugs which are to the inside of the body.
[0078]In a low liquid flow rate, the rate of the drugs emitted to a patient per unit time is in the tendency for which it comes to depend on the liquid flow rate which passes along the administration set 20 further. It is believed that the maximum of the drug concentration in the liquid 22 which leaves the chamber 106 is restricted to the safe highest for the two main Reasons. The density gradient formed in the column-like tube shape chamber 106 means that the concentration of the liquid 22 in the intrusion point to the 2nd cannula 102 is the minimum in which height in the tube shape chamber 106. When increasing the danger of the high drug concentration which the liquid flow rate which passes along the administration set 20 becomes less, and cannot usually be permitted [2nd] to a patient, The quantity of the liquid turbulent flow which was formed in the chamber 106 and to mix also becomes less, and a density gradient is expanded so that the difference of the density from the stopper's 104 zone to the 1st end 102a of the 2nd cannula 102 may become large.
[0079]In [should care about that an above-mentioned different liquid flow rate is only possibility, and] a desirable work mode, A nurse or other medical people will set the flow which can be permitted by a flow limit means (it is (like the roller clamp 40 or a peristaltic pump)), and will not adjust a flow again to the discharge backward of ** 108 useful at least.
[0080]The administration set 20 provided with the peculiar cartridge 44 and the socket 42 can emit ** 108 with a remedially useful useful quantity to within a time [remedially permissible]. For example, the 1g dose of the ampicillin in the chamber 106 can be emitted in about 30 minutes in the flow of 120ml/hour.
[0081]In a desirable example, the tube shape chamber 106 has a capacity of about 10 ml, and can contain the air up to about 3 thru/or 4 ml. The inside diameter of a tube shape chamber is about 0.4 inch (1.061 cm). The height of the tube shape chamber from the mouth 110 to the crowning 126 is about 2 inches (5.08 cm). As indicated to U.S. Pat. No. 721,991 for which it applied on December 3, 1984, The

amount of [116] hollow circle cone-shaped part of the stopper closing implement 104 with which it can run through helps mixing, and it is believed to form an additional turbulent flow in the intrusion point of the liquid 22 in the 1st end 100a of the 1st cannula 100. The chamber 106 of comparison low length is, and narrow form is believed to help mixing with the liquid 22 of useful ** 108. For example, a 5% glucose solution may be sufficient as the liquid 22.

[0082]By changing the size of the tube shape chamber 106, it should note that the discharge profile of useful ** 108 is changeable. For example, it will start for a long time by emitting ** 108 in the chamber 106 to the patient 26 by expanding the inside diameter of a tube shape chamber. Similarly, lengthening the chamber 106 will extend discharge time, if the 2nd cannula 102 is extended within the long chamber 106.

[0083]Other administration sets 136 for emitting the useful drugs 108 using the socket 42 and the cartridge 44 of this invention are illustrated by drawing 10, and the same element is described by the same number in it. The administration set 136 helps priming of the set 136 including the standard flexibility plastic dropping room 138 for counting droplet. It is equipped with the socket 42 downstream from the dropping room 138.

[0084]The air flask 46 is not contained. Even when equipped with the cartridge 44 on the socket 42, other means for discharging air from the cartridge 44 beyond it are formed. The air exhaust openings 140 are formed downstream from the socket 42 for this purpose. Air exhaust openings can contain a bacteria inhibition hydrophobic film. The air exhaust openings 140 can be made into the part of a liquid filter like the 0.22-micron sterilization filter 142. Such a filter is indicated by U.S. Pat. No. 4,568,366 of Frederic and others transferred to the grantee of this invention. This filter 142 contains the hydrophilic operation air fiber filter element which removes any granular material from the liquid 22.

[0085]drawing 11 -- and -- drawing 12 -- referring to it -- if -- a chamber -- 106 -- upright -- a cylinder -- 96 -- and -- a key groove -- a wall -- 118 -- having been similar -- a chamber -- 106 -- ' -- upright -- a cylinder -- 96 -- ' -- and -- a key groove -- a wall -- 118 -- ' -- containing -- **** -- a cartridge -- 44 -- ' -- illustrating -- having -- **** . Chamber 106' holding useful ** 108 is equipped with stopper 104' which contains metal band 112' in the surroundings of it, and it closes it. Tongue 114' holds tube shape chamber 106' to functional engagement with upright cylinder 96'.

[0086]The base plate 99 which crosses upright cylinder 96' and is prolonged is included in each 1st and 2nd cannula 100 and 102.

[0087]Cartridge 44' of this example contains the needle covers 101 which can be removed from the cartridge which adhered to the base plate 99 enabling free removal. The needle covers 101 which can be removed from a cartridge have a key objective which prevents connecting cartridge 44' to the socket 42, without ****(ing) stopper 104' in the cannula 100 and 102 first. If it puts in another way, the needle covers 101 will ensure that cartridge chamber 106' must be moved from the 1st position shown in drawing 11 to the 2nd position shown in drawing 12, before cartridge 44' can equip up to the socket 42. The cartridge 44 is premature, namely, if it is equipped before the cartridge 44 is moved to the 2nd position, the liquid which flows through an administration set will fall out of 1st end 100a' of 1st cannula 100', without going into cartridge chamber 106'.

[0088]Because of the comparatively small size of key groove wall 118', the needle covers 101 cannot be removed from cartridge 44', when being arranged, as it shows drawing 11.

[0089]The needle covers 101 contain the pin 103 containing the pin portion 105 which decreased in the tip of each pin. The pin is prolonged from the circular needle cover base 109. The base plate 99 contains

the annular ring Mr. groove 107 which accommodates the needle cover base 109 into it. In the point that the opening 111 met the ring Mr. groove 107, it extends through the base plate 99, and the pin 103 is preferably accommodated in interference fitting, therefore the needle covers 101 suit without separating carelessly from the base plate 99.

[0090]tube shape -- a chamber -- 106 -- ' -- a top -- a cartridge -- 44 -- and -- a chamber -- 106 -- being related -- explanation -- following -- drawing 12 -- having illustrated -- the -- two -- a position -- moving -- having -- the time -- running through -- obtaining -- a stopper -- 104 -- ' -- or -- others -- a closing means -- a base plate -- 99 -- contacting -- before -- a pin -- 103 -- being engaged . This downward movement to the pin 103 is forced out of interference fitting which showed drawing 11 the needle covers 101. Now, the tip 113 of the needle covers 101 can be projected exceeding the end of key groove wall 118', can grasp the tip 113, and can remove it by human power. Instead, probably interference fitting does not exist any longer between the base plate 99, a needle, and the covering 101, therefore, now, the needle covers 101 will only fall out of cartridge 44' preferably, since now the narrow pin portion 105 is in the opening 111.

[0091]After removing the needle covers 101, cartridge 44' adheres to the socket 42 in the mode indicated about the cartridge 44 in the top.

[0092]In addition to prevention of unsuitable wearing of a up to [the socket 42 of cartridge 44'], the needle covers 101 prevent contact contamination of the cannula 100 and 102 again.

[0093]Reference of drawing 13 illustrates the alternative example 144 of the cartridge. A similar element holds the same reference number. In addition in this example, the cartridge 144 includes the upright cylinder 96 and the key groove wall 118. The tube shape chamber 146 is closed by closing implement like the stopper 104 with which it can run through. The chamber 146 contains the stage 148 for equipping with a granular material barrier. For example, it was equipped with the granular material barrier in the plastic rings 152 which adhered with heat sealing etc. in the stage 148, it can contain a 5-micron nylon network. Before using the cartridge 144, useful ** 108 continues being caught between the stopper 104 and the net 150. There are no useful drugs 108 into the chamber 146 apex portion 154 by the side of the upper part of the net 150. The explanation about the call aperture about a granular material barrier and material in the air flask 46 of drawing 3 is applied also like the granular material barrier 150.

[0094]The cartridge 144 as well as the cartridge 44 is accommodated in the upright cylinder 96, enabling a free slide. The chamber 146 is in the 2nd position in drawing 13, the 1st and 2nd cannula 100,102 runs through with the stopper 104, since the cartridge 144 is discharge of useful ** in the effluent object 22, it is equipped with this cartridge on the socket 42, and it is illustrated. During an operation, when the chamber 146 slides to the 2nd position, the 2nd hollow cannula 102 runs through with the granular material barrier 150, and is prolonged into the apex portion 154 of the chamber 146 in which useful ** is not stored. When a liquid goes into the chamber 146 through the 1st cannula 100, useful ** 108 is mixed with a liquid like the example indicated above. However, useful ** which enters and goes to the apex portion 154 with a granular material barrier has already dissolved into the effluent object 22. Even the level of the 1st end 102a of the 2nd cannula flows upwards, and the liquid 22 which has useful ** 108 mixed in it is then emitted to the lower stream toward a patient.

[0095]By catching useful ** 108 to the lower part of the tube shape chamber 146, it is believed that a better mixed operation is what may actually be generated. As for the cartridge 144, the 1st end 100a of the 1st hollow cannula operates to best only a few into the chamber 146 in a similar manner [cartridges / 44 and 44] at a certain time.

[0096]Reference of drawing 14 and 15 illustrates the adapter 160 for connecting to the socket 42 a chamber like the standard drugs vial 162 which has ** 164 useful in it in drawing 14. The adapter 160 contains hollow upright SHIERU 166 provided with the vial end 168 expanded for snap fitting engagement with the mouth 170 of the vial 162. The vial 162 contains the rubber stopper 172 which can run through into it. The expanded vial end 168 can include the projection 174. ********** permitted now [of William, an R, Aalto and others] when it applied for the restoration instrument which shows the same step fitting structure on August 21, 1984 It is indicated by No. 642,908. The adapter 160 contains the sliding plate 176 with which it was equipped in hollow upright SHIERU 166 enabling a free slide. The sliding plate 176 includes the projection 178 accommodated in the hollow within a shell wall enabling a free slide. An elastic material and the projection 178 mean standing it still and maintaining the sliding plate 176 until movement is meant.

[0097]It is equipped with the 1st hollow cannula 180 that has the 1st edged hollow end 180a that faces the expanded vial end 168, and the edged end 180b of the hollow which faces contrary to the expansion end 168 in the sliding plate 176.

[0098]The sliding plate 176 is equipped also with the 2nd hollow cannula 182 that has the 2nd edged hollow end 182b that faces contrary to the 1st edged end 182a of the hollow facing the expanded end 168, and the expanded end 168. The sliding plate 176 contains the handle part 184 which projects out of SHIERU 166 in the handle accommodation slot 186 within a shell wall. Upright SHIERU 166 includes the socket accommodation slot 188 in the surroundings of the bridge 130 of the socket 42 for wearing.

[0099]The 1st hollow cannula 180 contains the inlet passage means to the inside of the drugs vial 162 or other chambers. The 2nd hollow cannula 182 includes another outlet passage other than the drugs vial 162. The 1st end 180a and 182a of the cannula 180,182 contains the chamber **** means for ****(ing) the rubber stopper 172 of the drugs vial 162. The 2nd end 180b and 182b of cannula contains the socket **** means.

[0100]In an operation, a nurse or other medical people fit in in the end part 168 to which the adapter 160 expanded the drugs vial 162. An operator grasps the handle part 184 next, and it is moved within the slot 186, This moves the sliding plate 176 and the needle with which it was equipped toward the drugs vial 162, and the rubber stopper 172 is ****(ed) with both 1st and 2nd cannula 180,182. The surroundings of the socket 42 are equipped with the adapter 160 next, SHIERU 166 fits into the surroundings of it, it runs through with the part 80 with which 1st and 2nd KACHURE 180,182 can run through, and the 2nd cannula 182 engages with the bushing 92.

[0101]Reference of drawing 15 illustrates the alternative example 190 of the adapter similar to the adapter 160 shown in drawing 14. Here, the handle part 196 prolonged from the sliding plate 198 contains the air outlet 192 like a bacteria inhibition hydrophobic film and the 0.22-micron sterilization millipore filter 194. The 2nd hollow cannula 200 is formed from two separate segments, the segment 200a which faces the expanded adapter end part 168, and the segment 200b which faces on the contrary from the adapter end part 168. The segments 200a and 200b are in the free passage which crossed the filter 194 and was opened through the inside of the handle part 196. The existence of the air outlet 192 of the operation of the adapter 190 is the same as that of the operation of the adapter 160 except for providing an exit to the air in the drugs vial in priming. It is equipped also with the granular material barrier 194 in the adapter 190, and granular material is prevented from going to the lower stream toward a patient.

[0102]Reference of drawing 24 and 25 illustrates the cartridge 310 containing the upright cylinder 96 arranged in it enabling a free slide of the tube shape chamber 106 which has useful ** 108 in it. The base plate 312 crosses the cylinder 96 and is prolonged. The 1st and 2nd hollow cannula 314,316 containing the 1st edged hollow end 314a and 316a that faces the tube shape chamber 106 each one is arranged in the base plate 312. Like the cartridge 44, The 1st end 314a and 316a of the 1st and 2nd cannula 314,316 the tube shape chamber 106 of the cartridge 310 from the 1st position in non-engagement with the 1st and 2nd cannula the rubber stopper 104 of the tube shape chamber 106. It slides to the 2nd position illustrated to drawing 24 with which it ran through. The cartridge 310 includes the key groove wall 318 prolonged from the base-plate 312 side opposite to the tube shape chamber 106. The key groove slot 320 is formed in the key groove wall 318 around the bridge 322 of the socket 324 for fitting. The key groove wall 318 includes one or more internal projections 326.
[0103]Unlike the cartridge 44, the 2nd edged end 314b and 316b of each 1st and 2nd cannula 314,316 can be prolonged in the same distance from the base plate 312. The socket 324 includes the socket entrance 70 and the socket exit 72 which were connected to the fluid lead pipe of an administration set like the administration set 20. the upstream end where the socket 324 flows with the entrance 70 and which is in a free passage -- and the fluid acceptance segment 78 with the downstream end in the exit 72 and a free passage is included.
[0104]Although the socket 324 does not contain bushing like the bushing 92 in the socket 42, however so that it may indicate in detail later, If the cartridge 310 and the socket 324 are engaged thoroughly, all the liquids which flow through a socket must pass the tube shape chamber 106 first like [in the case of the cartridge 44 and the socket 42 which were indicated above].
[0105]The socket 324, Perilla frutescens (L.) Britton var. crispa (Thunb.) Decne. corresponding to a parenchyma top is carried out to the ring shape extension 334 containing the periphery 336 which Mr. Piston's injection site 338 which was built with the material with which elasticity like polyisoprene can run through, and with which it can run through expanded. The upper part and the lower part fixture 328,330 which form the annular groove 332 which accommodates it are included. Since the one or more nails 340 are the inner protrusion 326 and engagement on the key groove wall 318, it is provided in the surroundings of the outside of the socket 324. The outflow seal 342 can be fabricated in the lower part fixture 330 with the same, comparatively upright plastic material as the remainder of the lower part fixture 330. The outflow seal 342 forms the outflow passage 344 of a larger diameter than the 2nd hollow cannula 316 of the cartridge 310.
[0106]A nurse or other operators push the crowning 344 of the tube shape chamber 106 below, and the stopper 104 makes it slide to the 2nd position illustrated to drawing 24 which contacts the base plate 312 from the 1st position in an operation. As for the cannula 314,316, both **** the part 338 so that it may illustrate to drawing 24. However, the surroundings of the socket 324 are not thoroughly equipped with the cartridge 310 so that it may illustrate to drawing 24. In addition in drawing 24, the part 338 is in the usual position. It can be flowed through the fluid which flows into the entrance 70 through the exit 72 by flowing out without going into the chamber 106, and passing the surroundings of the seal 342.
[0107]Since a cartridge and a socket are engaged thoroughly, a nurse or other operators are further pushed below so that it may reach to the position which the upright cylinder 96 showed to drawing 25 and which was engaged thoroughly. The central climax portion 346 pushes the part 338 below, and it is made to shift from the normal position which illustrated it to drawing 24 to the 2nd deformation position

shown in drawing 25 below by applying downward pressure to up to the cartridge 310 about the socket 324. The part 338 is mutually moved in the right-angled direction on parenchyma to the ring shape extension 334 of a part. In the deformation position illustrated to drawing 25, the part 338 carries out the seal of the surroundings of the outflow seal 342 of a socket. The deformation position of the injection site 338 is maintained by mutual fitting of the engagement protrusion 326 and the nail 340.

[0108]The fluid which now flows into the entrance 70 and the fluid acceptance segment 78 is inevitably turned through the end 314b into the 1st hollow cannula 314 and the chamber 106 which has accommodated useful ** 108. The pressure to the part 338 top flows out with the part 338, and makes a fluid sealant effective between the seals 342 form. A liquid leaves the tube shape chamber 106 through the 2nd cannula 316, comes out of a socket as 72 copies of exits after that, and flows into the lower stream toward a patient.

[0109]The combination of the cartridge 310 and the socket 324 will eliminate manufacture of bushing for forming a single channel, and the necessity for an assembly, once engagement of the cartridge is carried out to the surroundings of a socket. After useful ** is emitted to a patient, the part 338 can return to the normal position shown in drawing 24 then by the ability to remove a cartridge, as for an operator, therefore it can be directly flowed through a liquid through a socket. The cartridge 310 can adhere through the socket 324 after that, and the part 338 is then forced again to the deformation position shown in drawing 25.

[0110]Reference of drawing 16 and 17 illustrates the cartridge 202 described in the reference number with same, same element. The cartridge 202 contains the tube shape chamber 106 and the upright cylinder 96.

[0111]Here, in cannula, the number of the 2nd hollow cannula 204 is at least one, and it contains two or more desirable orifices 206 in the lower part of the 1st edged end 206a, and the upper part of the base plate 98. The orifice can do formation ****** by use of laser. Having the cartridge 202 of the given size, the number of the orifices 206, arrangement, and change of the size will change the concentration of useful ** which should be emitted to a patient with the medical-application liquid 22. According to the number of orifices, a size, and arrangement, the divided specific concentration profile of the drugs in a liquid was formed. When a liquid goes into the chamber 106 from the 1st cannula 100, a hydraulic fluid level rises. Like the cartridge 44, a concentration gradient occurs along with the height of the chamber 106, and the concentration of drugs or other ** is the maximum by about 104 stopper, and the minimum 1st near the end 206a of the 2nd cannula. By the various orifices 206, it is permissible that some concentration layers come out of the chamber 106. The size and interval of the outlet orifice 206 determine the time of the layer of the following concentration level coming out of a cartridge. Although it is believed that the cartridge of this invention indicated in this Description has none of these orifices 206, and it operates good, use of the orifice 206 must be useful about a certain drugs with more difficult discharge.

[0112]The following formulas can express the quantity of useful ** emitted to the lower stream toward a patient within a time [which was given].

$DD=C_1Q_1+C_2Q_2$. ..... C_NQ_N -- DD is equal to the quantity of the drugs emitted in unit time here, and C_N is equal to the drug concentration in a fluid level or the layer N, and Q_N is equal to the quantity of flowing fluid through the hydraulic fluid level within the given unit time, or the orifice 206 in the layer N.

[0113]Q_N about a specific orifice is dependent on the liquid flow rate which passes along the size of the orifice, the number of the low orifices of the cannula 206 which exist highly and a size, and an administration set. Each orifice 206 can have the same orifice that counters it and directly on the cannula 204. If the given amount of maximum flow appearance which exists highly or is permitted by the orifice 206 under it is smaller than the liquid flow rate to the chamber 106, the liquid will go up to the high orifice 206 to the next in a chamber.

[0114]Drawing 18 thru/or 23, and the cartridge 208 for introducing useful ** into a fluid lead pipe, if it changes to especially drawing 18 thru/or 20 are indicated. The cartridge 208 includes the wall 210 which forms the chamber 212 which has useful ** 214 in it. The glass drugs vial containing the neck portion 218 with the open end which forms the body part 216 and the mouth 220 may be sufficient as the cartridge wall 210. It is equipped with a closing means like the stopper 222 which can run through with which it can run through in the head 218 of the mouth 220 and the cartridge 208. the lateral surface 224 where the stopper 222 faces the chamber exterior -- and the medial surface 226 facing the formed chamber 212 is included.

[0115]the stopper 222 which can run through -- the outside lid part 228 -- and the narrow plug portion 230 can be included. The lid part 228 contacts the end of the mouth 220, and the plug portion 230 is prolonged into the neck portion 218 of the chamber 212.

[0116]The chimney-like projection 232 is prolonged in parenchyma top rectangular directions to the stopper's 222 lid part 228 with which it can run through if it puts in another way in the parallel direction on parenchyma from the medial surface 226 at the length of a cartridge. The chimney 232, the plug portion 230, and the lid part 228 can be formed from the single piece of material like polyisoprene.

[0117]The closing means and the stopper 222 which can run through in this case are suitable for being run through in the point which aligned to the zone of the inside 234 of the chimney 232, the point which aligned, and the medial surface 226, and the exterior of the chimney 232. These two points are marked by each of reference numbers 236 and 238.

[0118]In the desirable example, the cartridge contains further the flow connector 240 suitable for equipping the surroundings of the mouth 220 of a cartridge, and a closing means. The flow connector includes a cartridge connecting means like the sleeve 242 with the expanded groove 244 which is in the end for the mouth 220 and the stopper 222 which can run through, and dense mutual fitting.

[0119]The flow connector 240 includes the base 246 with which the other end 248 of the sleeve 242 was equipped. As for the base 246, it is preferred to be equipped in the sleeve 242, enabling free rotation.

[0120]The flow connector 240 contains the 1st and 2nd cannula 250,252 with which it was equipped in the base 246. The 1st and 2nd cannula contains the 1st edged end 250a and 252a that faced the stopper which can run through. Cannula contains similarly the 2nd edged end 250b and 252b prolonged to a lower part from the stopper which can run through each one in the opposite hand of the base 246. To the length of the chimney 232, cannula is parallel on parenchyma and is prolonged in the right-angled direction on parenchyma to the lid part 228 of the stopper 222 which can run through.

[0121]The flow connector 240 contains further the projecting key 254 which has been prolonged from the paired-stoppers side side of the base 246. The key groove 256 which fits in is arranged in the stopper's 222 lateral surface 224. The position of the key 254 and the key groove 256 can be made reverse natural. A key and the key groove can have the circle design divided by the radius with the center where the center of the base 246 aligned.

[0122]The 1st end 250a and 252a of cannula is prolonged in the same distance on parenchyma from the chamber confrontation side of the base 246. In a desirable example, the 2nd end 250b and 252b of cannula is arranged so that the 2nd end 252b of the 2nd cannula may be prolonged from the 1st cannula 250 from the chamber distant place side of a base to a distance.
[0123]The base 246 includes the extension wall 258 which was prolonged from the chamber distant place side, and surrounded the 1st and 2nd cannula, and is separated. The extension wall 258 includes the slot 260 formed into it. The damage to the extension wall 258 and the 2nd end 250b, a 252b nurse, or other operators is prevented, and the cap 262 provided in order to prevent contact contamination of cannula covers.
[0124]The slot 260 in the extension wall 258 serves as a key groove means for making possible suitable engagement with a socket like the socket 42 with which it was equipped into the fluid lead pipe 28 of the administration set 20 of the cartridge 208.
[0125]In an operation, a nurse or other operators remove the cap 262 from the extension wall 258, Rotate until the key 254 and the key groove 256 fit in, and an extension wall the time delay long wall 258 and base 246, Until the 1st and 2nd cannula 250,252 runs through with a closing means from the 1st position shown in drawing 19 to which hollow cannula is separated from the chamber 212 and hollow cannula moves to the 2nd position shown in drawing 20 which flows with the chamber 212 and is in a free passage, It is pushed toward the stopper 222 which can run through. In the 2nd position, the 1st cannula 250 **** a stopper's medial surface 226 in an outside point to a chimney. The 2nd cannula 252 **** the stopper 222 so that the 1st end 252a may be arranged in the chimney 232.
[0126]The cartridge 208 is inserted in the surroundings of the socket 42 shown in drawing 1 by next equipping with the slot 260 on the bridge 130 of the socket 42. In this position, the 1st and 2nd cannula 250,252 will be arranged in the socket in the same mode as the 1st and 2nd cannula 100,102 shown in drawing 9. The liquid which flows into a socket will flow into the chamber 212 through the 1st cannula 250, and will be mixed with useful ** 214 in it. The liquid will flow down the chimney to the patient through the 2nd cannula 252 and bushing 92, when a liquid goes up the level of the crowning 264 of the chimney 232. Instead, the length of the cannula 250,252 on the stopper distant place the base 246 side can be changed so that the cartridge 208 can be used with the socket 324 shown in drawing 24 and 25.
[0127]If drawing 21 thru/or 23 are referred to, in addition it includes a closing means like the stopper 270 which forms the chamber 272 with the comparatively impermeable wall 268 and it to a steam and air and which can run through with which it can run through, other cartridges 266 are indicated. The stopper 270 which can run through includes the lateral surface 276 and the medial surface 278 facing the chamber 272.
[0128]The chimney 280 will be prolonged in the right-angled direction on parenchyma to the lateral surface 276, if it puts in another way from the medial surface 278 in the parallel direction on parenchyma to the length of a cartridge. Useful ** 282 is stored in the chamber inside chimney 280 itself. The crowning 286 of the chimney 280 is equipped with the liquid permeability barrier 284 like the granular material barrier which has about 20 microns or less in a call aperture like a nylon mesh screen. The liquid permeability barrier 284 holds useful ** in the chimney 280 until the cartridge 266 is inserted into the adapter 42.
[0129]The cartridge 266 in a desirable example is provided with the flow connector 288 with the base 290. The base 290 contains chamber distant place side 292 and chamber confrontation side 294. Each

1st and 2nd cannula 296,298 is attached all over the base 290. The extension wall 300 is prolonged from chamber distant place side of base 290 292, and it has the slot 302 which makes it possible to equip with the cartridge 266 on the socket 42 in the mode indicated about other cartridges in the top.

[0130]The 1st edged end 296a of the 1st cannula 296 is prolonged from the base 290 in a distance shorter than the 1st end 298a of the 2nd hollow cannula 298. The 2nd edged end 296a of the 1st hollow cannula 296 is similarly prolonged with the aforementioned cartridge 44 from the chamber distant place side of the base 290 in a distance shorter than the 2nd hollow end 298b of the 2nd cannula 298 for use. Since it is used with a socket like the socket 324 illustrated to drawing 24, arrangement of the 2nd hollow cannula end 296b and 298b can be changed.

[0131]In use, an operator passes the stopper 270 which can run through until it contacts the stopper 270, as illustrated in chamber confrontation side 294 of the base 290 to drawing 22, and pushes the 1st and 2nd cannula 296,298.

[0132]However, it is the 1st cannula 296 that the 2nd cannula is arranged in the chimney 280 in the example which was illustrated to drawing 21 thru/or 23 unlike drawing 18 arranged in the chimney thru/or the example of 20. Since useful ** is held in the chimney, the channel to the liquid top mixed with useful ** is formed in the inside of the chimney itself.

[0133]Eventually, a liquid reaches the liquid permeability barrier 284 and flows down the paries lateralis orbitae of the chimney 280. The liquids which have useful ** in it gather into the chamber 272 of the exterior of the chimney 280. It goes up until it attains a hydraulic fluid level to the level of the 1st end 298a of the 2nd cannula 298, and then, the navel in the 2nd cannula 298 of the liquid is carried out, and it flows into the lower stream toward a patient. Wearing of the cartridge 266 containing the surrounding flow connector 288 of the socket 42 is illustrated by drawing 23.

[0134]Although some examples and the features were indicated in detail here and it was shown in the accompanying drawing, probably, it will be obvious for other various examples to be possible, without deviating from the scope of invention which carried out claim for patent.

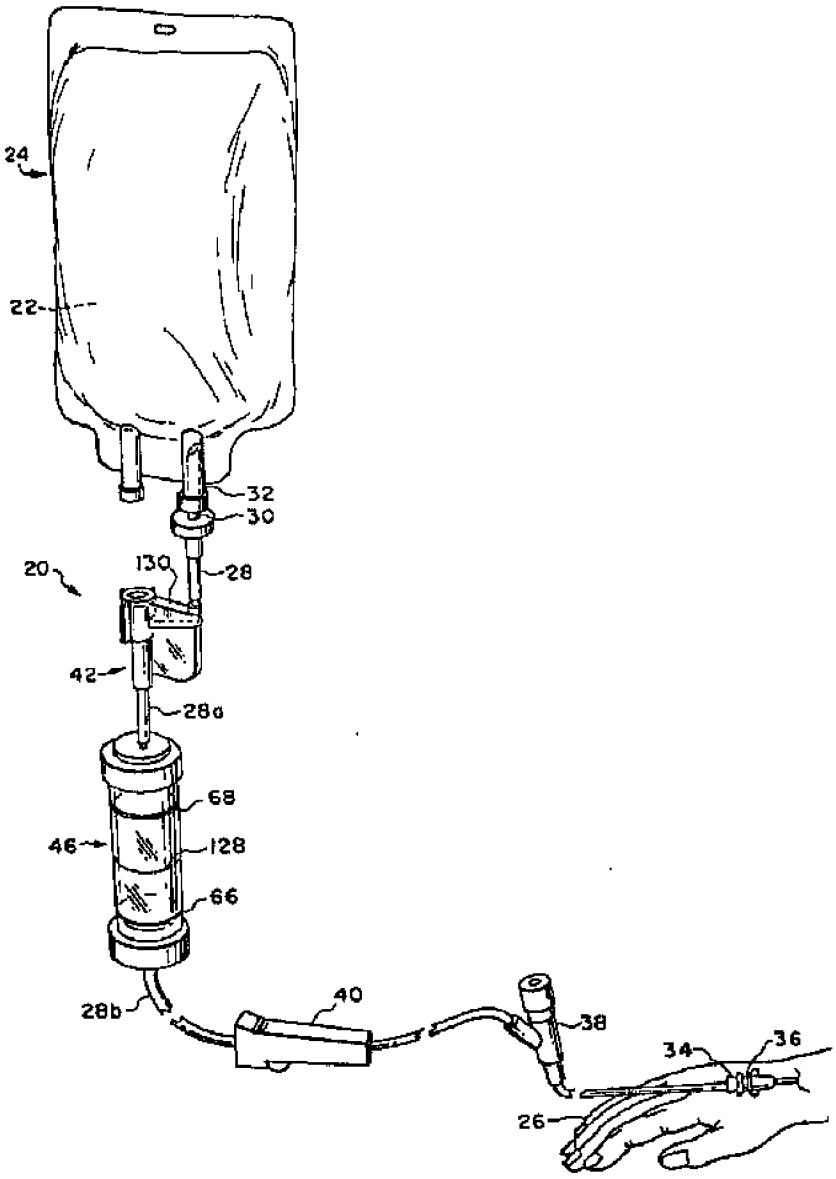
[Translation done.]

* NOTICES *

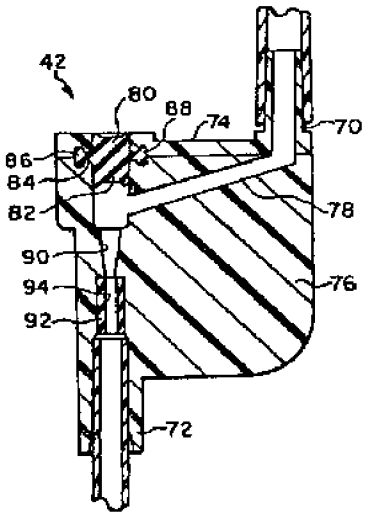
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

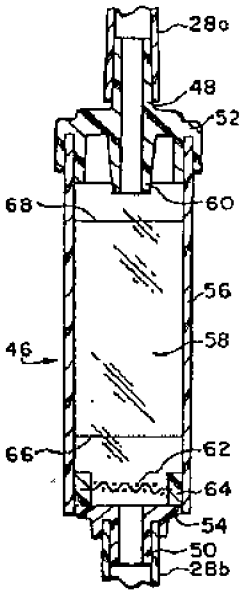
[Drawing 1]



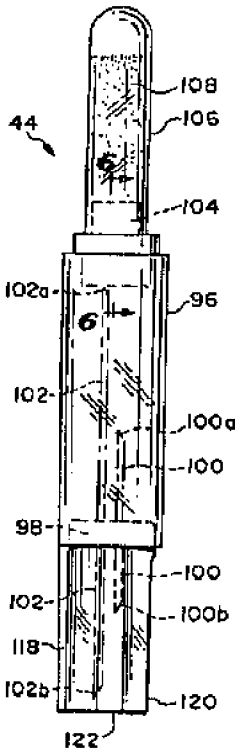
[Drawing 2]



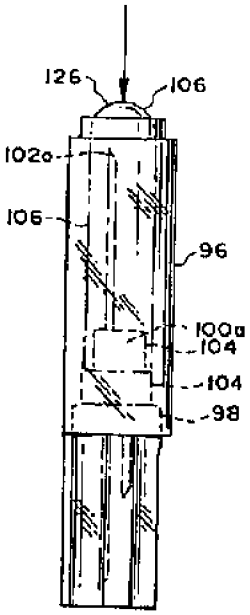
[Drawing 3]



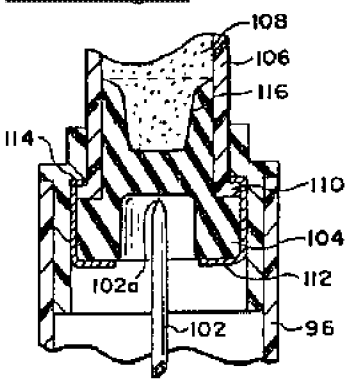
[Drawing 4]



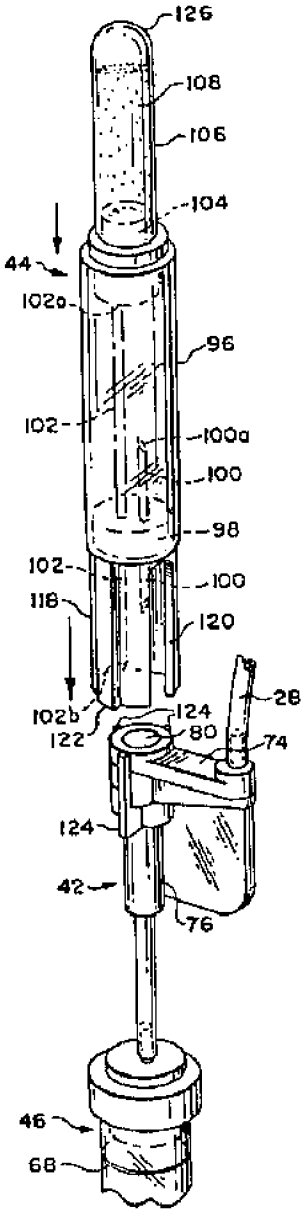
[Drawing 5]



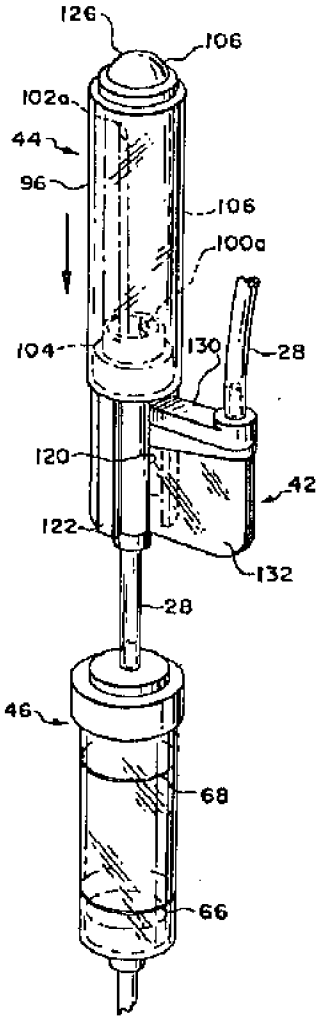
[Drawing 6]



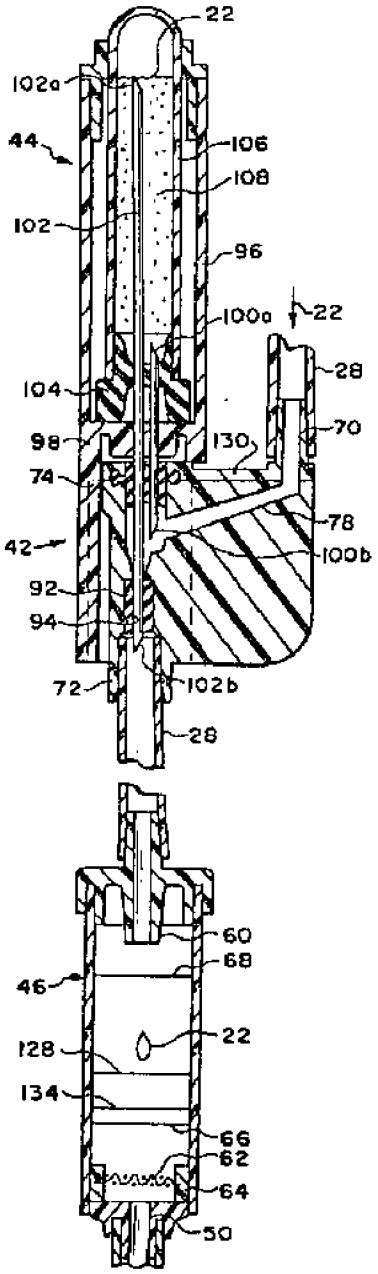
[Drawing 7]



[Drawing 8]



[Drawing 9]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44
106
108
102
96
100a
22
28
104
70
98
130
74
78
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100b
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102b
28
60
68
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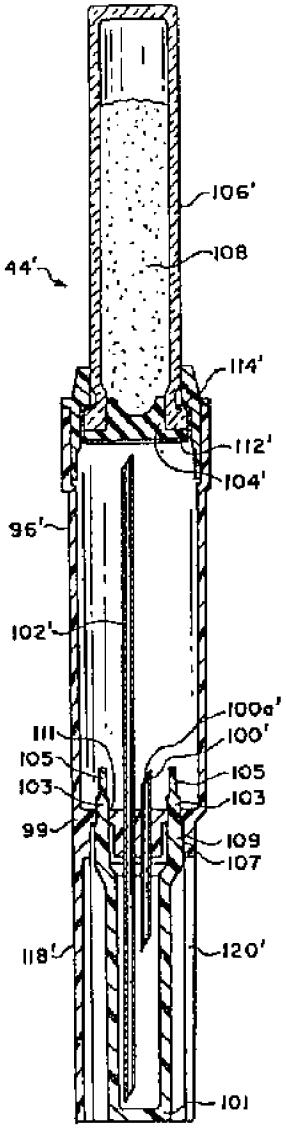
64
50

[Drawing 10]


106'
108
44'
114'
112'
104'
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100a'
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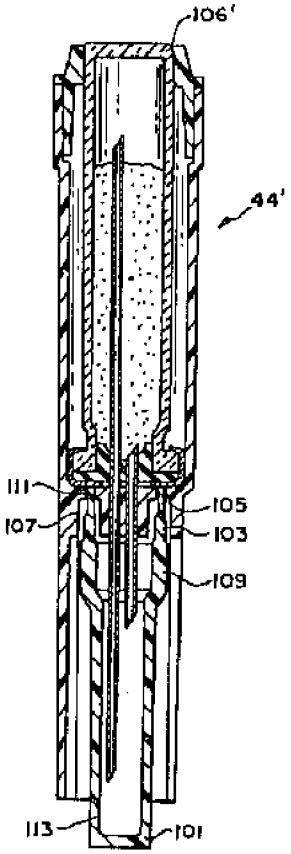
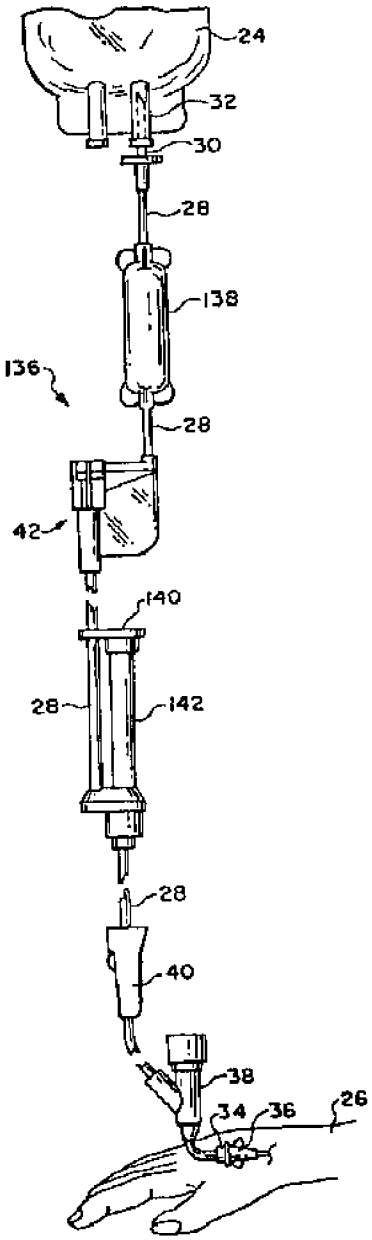
118'
120'
101

[Drawing 11]



[Drawing 12]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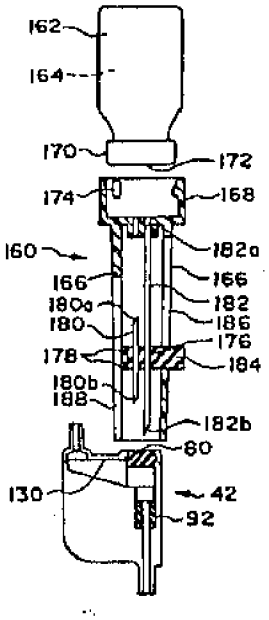
36
26

[Drawing 14]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168
160
182a
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180a
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176
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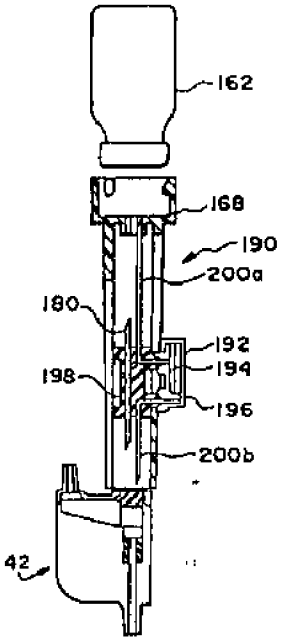
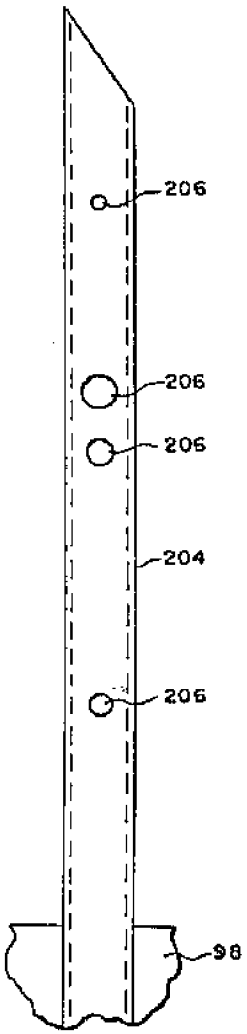
180b
188
182b
60
130
42
92

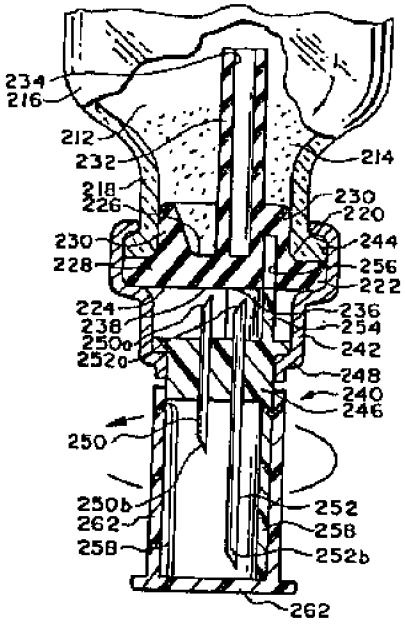
[Drawing 15]



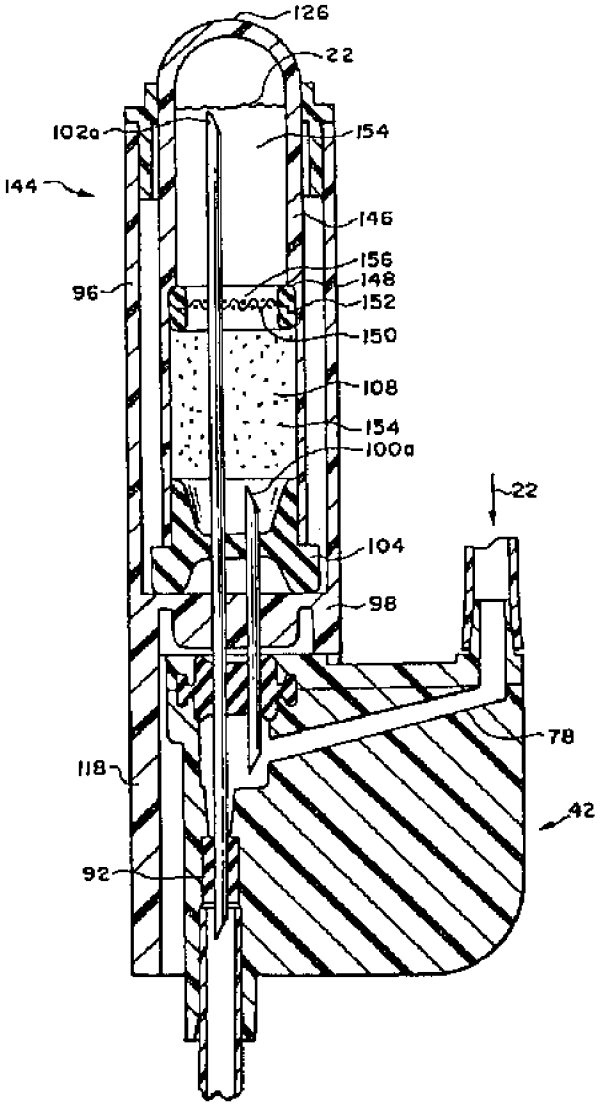
[Drawing 17]



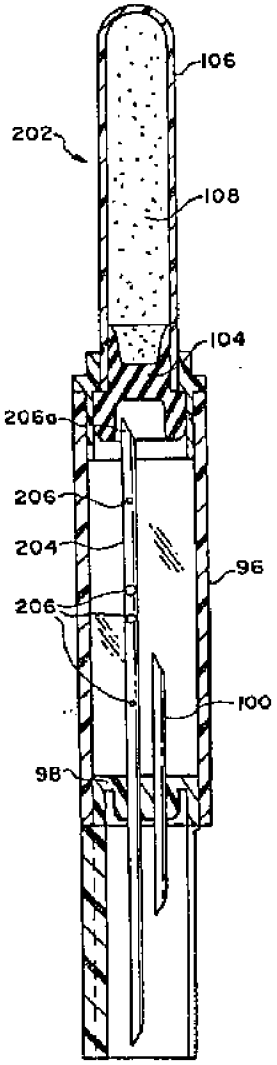
[Drawing 19]



[Drawing 13]



[Drawing 16]



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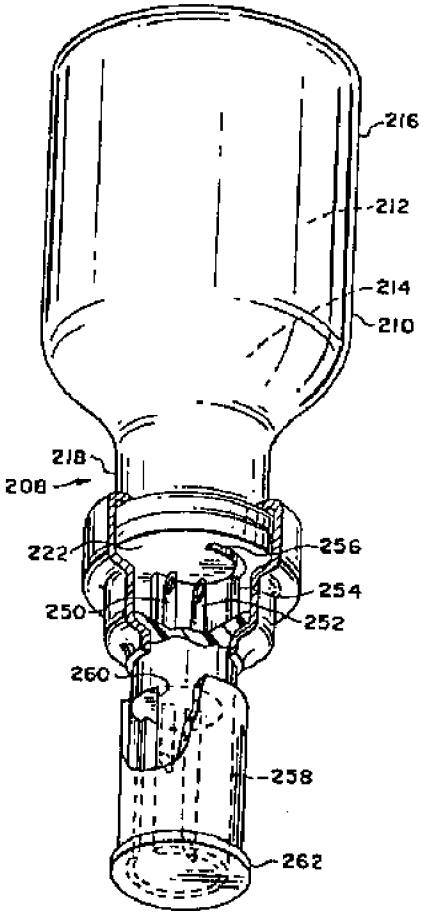
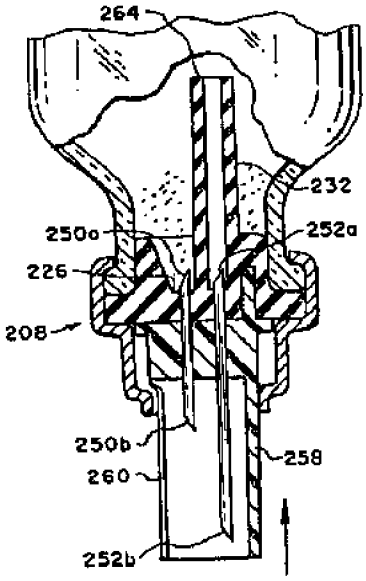
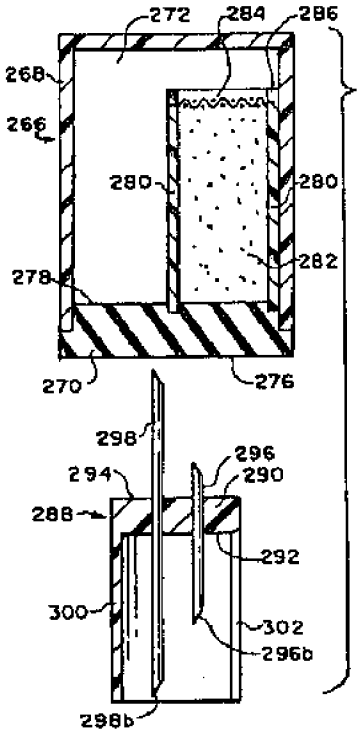


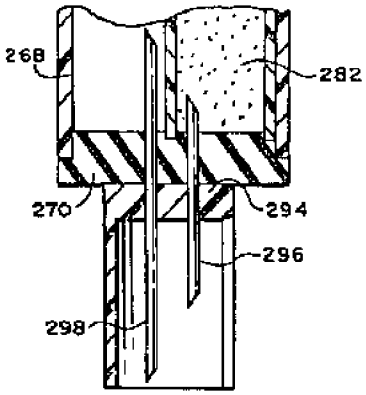
[Drawing 20]



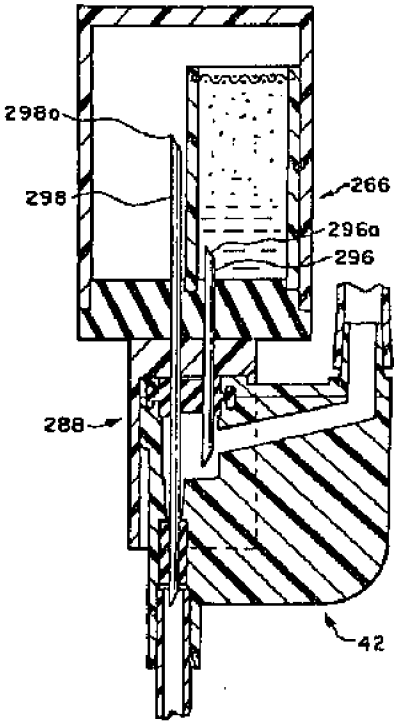
[Drawing 21]



[Drawing 22]



[Drawing 23]



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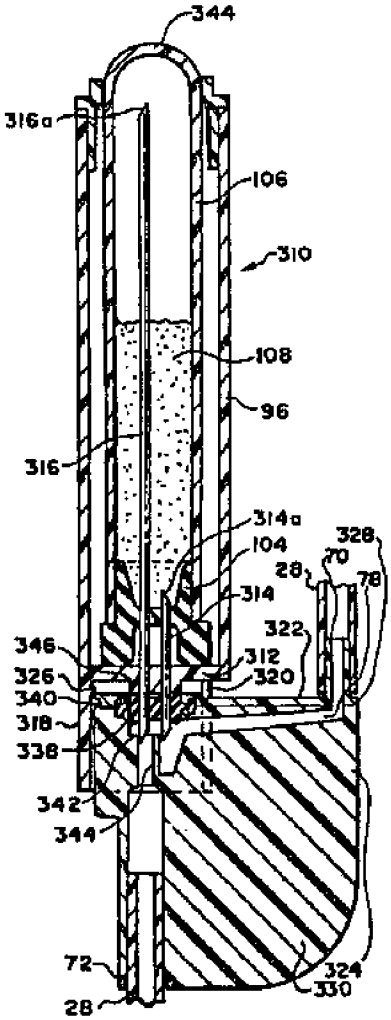

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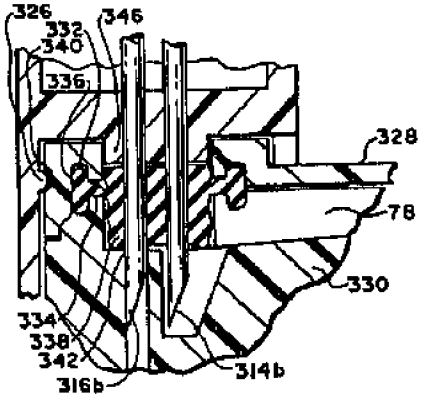

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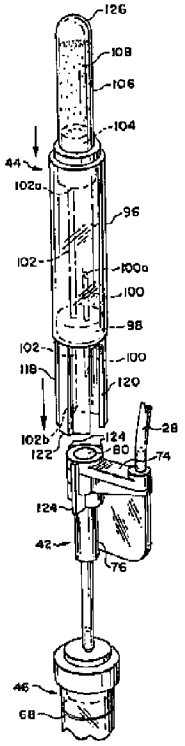
(54)【発明の名称】　受動的薬剤放出ソケット

(57)【要約】　（修正有）
【目的】患者へ医療用溶液を放出し、そして有益な剤を収容する改良された設計のカートリッジを収容するのに適している投与セットの改良を提供。
【構成】投与セットを通って流れる液体２２で薬剤１０８を受動的に復元し、放出するための医療用液体投与セットが開示される。投与セットに装着されたソケット４２は有益な剤を収容したカートリッジ４４を受入れるのに適している。投与セットにはソケット４２の下流に空気フラスコ４６が備えられる。カートリッジとソケットを接続するためのアダプターも備える。



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【特許請求の範囲】

【請求項1】医療用液源および患者へ接続に適している流体導管を含んでいる投与セット中に挿入するのに適しているソケットにして、（a）流体導管の上流部分へ接続に適している入口、（b）流体導管の下流部分へ接続に適している出口、（c）前記入口と流体連通にある上流端および前記出口と流体連通にある下流端をもっている流体受入れセグメント、（d）刺通し得る部位、（e）前記刺通し得る部位を通って前記ソケットへ侵入するカニューレを前記流体受入れセグメントから隔離すると同時に該カニューレと前記ソケット出口との間の流体連通を許容するための手段を備えていることを特徴とする前記ソケット。

【請求項2】前記ソケットへ侵入するカニューレを前記液体受入れセグメントから隔離する手段（e）は、前記受入れセグメントの下流で前記刺通し得る部位に関して整列して配置され、前記刺通し得る部位を通ってソケットへ侵入するカニューレの外側を液密にシールする弾力性ブッシングである請求項1記載のソケット。

【請求項3】前記ソケットへ侵入するカニューレを前記液体受入れセグメントから隔離する手段（e）は、弾性変形し得るピストン様の刺通し得る部位（d）と、液体受入れセグメント中に該ピストン様刺通し得る部位と対向して設けられ、該ピストン様刺通し得る部位の弾性変形によりソケットへ侵入したカニューレのまわりに液密シールを形成し得る流出シールとによって構成される請求項1記載のソケット。

【請求項4】前記刺通し得る部位は刺通し得る主本体部分と、主本体部分の周縁のまわりのリング状延長部を含み、前記リング状延長部は拡大した外周縁を有し、
前記ソケットは前記拡大周縁を含む前記リング状延長部に実質上対応しそしてそれを収容する環状みぞを形成する上方および下方取付具を含み、そのため前記上方および下方取付具が前記刺通し得る部位をその間に捕捉し、前記ソケットを破壊することなく前記部位の除去を防止する請求項1または2または3記載のソケット。

【発明の詳細な説明】

【0001】本発明の技術分野

本発明は、有益な薬剤の患者への放出に関し、そしてさらに詳しくは安全にして効果的な態様で患者の静脈系への有益な剤の受動的放出に関する。

【0002】本発明の背景

多数の薬剤は患者へ静脈内投与される前に希釈液と混合される。希釈液は例えばデキストロース溶液、食塩水または水でさえあり得る。多くのそのような薬剤は粉末形で供給され、そしてガラスバイアルまたはアンプル中に包装される。化学療法に使用されるもののような他の薬剤は液状でガラスバイアルまたはアンプル中に包装される。

【0003】粉末薬剤は、注射器が液を混合のためバイアル中へ注入するために使用され、最終的には混合された溶液をバイアルから吸入する、注射器を使用して良く知られた態様で復元することができる。薬剤が患者へ放出前希釈されなければならない時、該薬剤はそれが復元された後希釈液容器へしばしば注入され、その時該容器は患者へ放出のための投与セットへ接続されることができる。さらに詳しくは、希釈液はガラスびん、またはイリノイ州ディヤフィールドのトラベノール、ラボラトリーズ、インコーポレイテッドによってミニバッグおよびバイアフレックスなる名称で販売されているような可撓性プラスチックバッグ中にしばしば包装される。これら容器は容器中味を容器から患者へ放出する投与セットへ接続するための投与ポートを持っている。薬剤は典型的には容器上の注射部位を通って添加される。

【0004】薬剤は種々の理由で希釈液とは別々に包装される。最も重要な理由の一つは、多数の薬剤は希釈液と混合した時その化学的および物理的安定性を保ち得ず、そのためどんな実質的時間期間も貯蔵できないことである。また、薬剤を製造する多数の会社が静脈内放出のための容器に入った医療液を提供する事業を行っていないため、およびその反対のため、薬剤がしばしば希釈液とは別々に包装される。

【0005】それ故、医師、看護婦、薬剤師または他の医療人は薬剤と希釈液を混合しなければならない。これは多数の問題を提起する。復元操作は時間を消費し、そして無菌技術を必要とする。オペレーターは開始前適切な希釈剤および注射器を準備しなければならない。しばしば粉末薬剤はバイアルの底でケーキ化する。このため液体が注射器からバイアル中へ注射される時、液体と粉末薬剤との間の接触表面積は当初全く小さいことがあり、そのため混合操作をさらに時間消費にする。限られたバイアル容積のため、希釈液中の増加して行く薬剤濃度は復元プロセスを終了することを困難にする。オペレーターは反復して溶液をバイアル中へ注射し、混合しそして吸引することによってこれを解決することを試み得るが、しかしこれは余分の注射と注射器の運動を必要とし、汚染の可能性を増加させる。また、薬剤および／または液体の全部をバイアルの外へ出すことが時々困難であり、このため復元操作を実施するのに要する時間を増加させる。

【0006】復元操作は好ましくは無菌状態で実施されなければならない。そのような要求はオペレーターを不当にさらに注意深くさせ、そして一層時間を消費することに加え、無菌状態はしばしば維持するのが困難である。ある場合には、そのドで復元操作が実施される層流フードを必要とすることがある。

【0007】化学療法剤のようなある薬剤は有毒である。復元中オペレーターの薬剤への曝露は、もしオペレーターがそのような薬剤を毎日作業し、それらへ繰り返して曝露されれば危険となり得る。

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【０００８】他の問題は、復元操作がどの容器がどの薬剤を収容しているかについて混乱の源を提供することである。希釈液容器は、それへ注射された薬剤と、それが放出されなければならない患者の名前とをマークされなければならない。

【０００９】薬剤が復元されそして注射筒中へ吸入された時、薬剤はある場合には患者の静脈系へ直ちに注射されることができる。しかしながらもっと典型的には、復元された薬剤は、注射器から、静脈内投与セットへの接続のため、上で論じたように大きい溶液容器へ注入される。これはしばしば注射器中の復元された薬剤が針が皮膚を刺す注射部位近くの患者の静脈内に局所毒性を発生するほどなお高い濃度にあるためである。これは医学的に有害である重い静脈刺激を発生し得る。加えて、投薬の適正投与量が注射器に入っているけれども、患者の血流中への即時注射は、患者の全体血液流中の薬剤濃度レベルが危険なほど高い全身毒性の状態を発生し得る。

【００１０】注射器から患者へ直接注射しないなお他の理由の一つは、それは患者にとって痛いそして感染に対して他の機会を提供する余分の注射部位を患者に発生させることである。

【００１１】これらの理由のため、復元された薬剤はもっと典型的には希釈液容器中へ注射される。

【００１２】患者は、典型的には例えば１Ｌ容器のような大容積非経口容器から、トラベノール、ラボラトリーズから販売されているCONTINUFLO投与セットのような投与セットを通って放出される、デキストロースまたは食塩溶液を投与されることができる。もし復元薬剤が大容量非経口容器中へ注射されるならば、薬剤の放出は通常長過ぎる時間にわたって放出されるであろう。しばしば、これら大容量流体は非常に遅い流量で放出される。

【００１３】さらに典型的には、復元した薬剤は、トラベノール、ラボラトリーズによって販売されている５０ｍｌ容器のような、小容量非経口容器中へ注射される。このミニバッグ容器は大容量非経口容器よりも高い高度に吊され、そして二次的な投与セットによって一次的投与セット上の注射部位へ接続される。それはより高い高度に維持されるため、小容量容器中の復元薬剤が放出された後、大容量容器からの流体がもう一度流れ始める。

【００１４】閉鎖した復元放出システムが、すべて本発明の譲受人へ譲渡された米国特許No. 4,410,321; 4,411,662； 4,432,755および 4,458,733に開示されている。そこに示されているように、容器は薬剤および希釈液を別々のコンパートメント中に含み、それらは薬剤が患者へ放出される前に閉鎖系内において復元される。典型的には、該容器は、上で論じた小容量非経口容器を持ったような一次投与セットの他端において接続された投与セットへ接続される。これら特許に示された容器は、注射器復元に関連する問題の多くを解決する。しかしながらこの製品は、看護婦または他のオペレーターが流体

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を容器から放出する前に実施しなければならない一連の復元ステップを必要とする。

【００１５】オペレーターによる復元ステップを必要としない態様で薬剤または他の有益な剤の放出が、カリフォルニア州パロアルトのアルザ、コーポレイションへ譲渡された米国特許No. 4,424,056; 4,432,756； 4,439,183； 4,474,574； 4,479,793； 4,479,794およびカナダ特許No. 1,173,795 に示されている。これら特許に開示されているように、薬剤のような有益な剤を投与するためのフォーミュレーション室をその中に有する非経口放出システムが開示されている。このシステムは、例えば大容量非経口容器から、薬剤がその中にあるフォーミュレーション室を含んでいる投与セットを通って流れる流体によって薬剤の復元を提供することにおいて有利である。このシステムは前記した時間を消費する復元操作の必要性を排除することを意図し、そして復元操作に関連する問題を排除するように見える。

【００１６】他の受動的復元システムがスウェーデンのアクチエボラゲット、ハッスルのヨーロッパ特許No. 0059694 に開示されている。

【００１７】薬剤をインラインで、すなわち投与セット中で放出するためのなお他の器具が、スイスのチバ、ガイギー、アーゲーへ譲渡されたオーストラリア特許No. 15762 ／83および対応するヨーロッパ特許No. 0100296 に開示されている。この器具は薬剤を保持し、そして液体が患者へ流れる一般方向と実質上反対方向に液体が通過するセクションを含んでいる。

【００１８】看護婦または他のオペレーターによる人手による復元なしに、インラインの薬剤復元を提供しようとするなお他のシステムが、インディアナ州インディアナポリスのイライ、リリー、アンド、カンパニーへ譲渡された米国特許No. 4,465,471 に示されている。この特許は投与セット自体中のソケットのための構造を開示する。復元し患者へ放出すべき薬剤を収容した別のカートリッジが該容器中へ詰められる。液体が薬剤の復元およびその後カートリッジおよび容器から出て患者へ放出のためにカートリッジへ侵入する時、流体の一部または大部分は投与セットを通って流れ続け、カートリッジを完全にバイパスする。

【００１９】イライ、リリー、アンド、カンパニーのヨーロッパ特許出願公告第 0146310号は、静脈投与セットと薬剤バイアルとを含み、薬剤を復元するためにバイアル真空を利用する薬剤復元のためのシステムに関する。

【００２０】アカーズらの米国特許第 4,534,758号は各種のバルブを備えた比較的複雑な薬剤放出システムを開示する。容器からの液体が薬剤バイアル中へ放出される時、バイアルは以前は乾燥した薬剤を懸濁するために十分な時間かきまぜられる。

【００２１】カリフォルニア州サンディエゴのアイバック、コーポレイションへ譲渡されたミラードらの米国特

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許第 4,581,614号は薬剤バイアルから静脈内投与セットを通って患者へあらかじめ復元した薬剤を放出するためのセレクターバルブを開示する。

【００２２】上に記載したすべての発表は、時間を消費する復元操作およびそれに関連する問題への解決法に向けられている。提案された解決法の大部分において、薬剤の放出は受動的であること、すなわち一旦薬剤が投与セット中へ入れられれば、人手による復元ステップは必要としないことが意図されている。これら発表中に開示された試みられた解決法の他の共通な特徴は、薬剤の放出が投与セットを通りそして患者への流体流量とは実質上無関係な態様で可能であることが意図されていることである。別ないい方をすれば、これらシステムは薬剤のある投与量をあらかじめ選択した時間内に広範囲の流体流量内で放出するように設計されている。流量に無関係な薬剤の放出は、それが薬剤および投与量によって変化するけれども、典型的には約２０ないし３０分である治療上許容し得る時間内に必要な投与量が放出されることを確実にするため好ましい。

【００２３】薬剤および他の有益な剤の放出を流量と無関係にすることにより、システムは、たとえ流量が看護婦または他のオペレーターによって過度に高くセットされても薬剤が過度に速く放出されないことを確実にし、上で論じた全身毒性の問題を防止する。

【００２４】米国特許No.4,424,056； 4,479,793；および 4,479,794のような文献のあるものは、やはり剤を混合しそして患者へ放出するための投与セット中にインラインに配置された有益な剤を有し、剤の放出は流体の与えられた容積で実施することができるシステムに向けられている。また、流体流を制御する弁は、剤を流体流に依存できる態様で放出するように人手で作動することができる。

【００２５】少なくとも上で論じた自動復元タイプのシステム（すなわち、別のかきまぜまたは混合ステップを必要をしないもの）は、患者へ放出される液体中の有益な剤の濃度が低い流量において高くなり過ぎる可能性を蒙る。これは体内への導入点近くにおいて患者へ局所毒性を発生する。この問題は、本発明の譲受人へ譲渡されたトーマス、イー、ニードハムらの１９８４年１２月３日に出願された“局所および全身毒性を防止する薬剤放出装置”と題する米国特許出願第 721,999号に開示された発明によって解決される。有益な剤の受動的混合および患者への放出の問題に対する他の解決法は、やはり本発明の譲受人へ譲渡された１９８４年１２月３日に出願された、ブライアン、ズデブらの“有益な剤と希釈液との受動的混合を可能とするハウジング”と題する米国特許出願第 721,991号に記載されている。該出願中には、患者へ有益な剤を放出するためのいくつかのハウジング構造が開示されている。典型的には、ハウジングは医療用液体投与セットにインラインに配置されたソケット

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と、そして有益な剤を含んでいる別体のカートリッジを含んでいる。カートリッジは患者へ有益な剤を放出しようと望む時ソケットへ差し込まれる。看護婦または他のオペレーターによる積極的復元は必要としない。その代わり、一旦カートリッジがソケットへ差し込まれると、投与セットを通って医療用液体源から流れる液体はソケットおよび薬剤含有カートリッジ中へ流入し、薬剤を復元する。その中に薬剤をもった溶液はソケットから投与セットを下流へ患者の静脈系へ流れる。

【００２６】外部環境と連通を少しも必要としない、有益な薬剤の受動的混合および患者への放出に適した投与セットを持つことが望ましいであろう。

【００２７】容易に製作することができ、そしてそれへカートリッジの取付けを簡単にそして効果的に許容する投与セット中のソケットの構造を持つことが望ましいであろう。ソケットへ流入する液体がカートリッジをバイパスする漏れなしにカートリッジを通って流れることを確実にするソケットを提供することが望ましいであろう。

【００２８】刺通し得る部位の不注意な除去の可能性なしに単一のソケットに複数のカートリッジの反復使用の間１本以上のカニューレの反復挿入および除去に耐えることができる改良された刺通部位を含んでいるソケットを提供することが望ましいであろう。

【００２９】コストが安く、製作が容易で、ソケット上の簡単な速いそして適切な整列装着を提供する設計の有益な剤を収容するカートリッジを持つことが望ましいであろう。

【００３０】与えられたカートリッジデザインについて、患者へ向かって下流へカートリッジを流出する液体のあらかじめ選定した薬剤濃度を変えることが望ましいであろう。

【００３１】カートリッジ設計が患者へ薬剤の適切な量および濃度を放出するための適切な流体流路を確実にする有益な剤を収容するカートリッジを提供することが望ましいであろう。

【００３２】本発明の概要

本発明は、薬剤または他の有益な剤の復元のために要する時間のかかる手動ステップを排除する。本発明は患者へ医療用溶液を放出し、そして有益な剤を収容する改良された設計のカートリッジを収容するのに適している投与セットの改良を提供する。一具体例において、投与セットはソケットへカートリッジの接続と、そして空気排出口を全く必要なくカートリッジの内部から後からの空気の排除を許容し、完全に閉鎖されたシステムを形成する。

【００３３】好ましい一具体例において、投与セットは医療用液源とそして患者の静脈系へそれぞれ接続のための上流および下流接続手段を含んでいる流体導管を含んでいる。有益な剤を含んでいるカートリッジを収容する

ためのソケットが流体導管に沿って取り付けられる。ソケットへカートリッジを架装する時、ソケットを通って流れる液体の少なくとも一部、好ましくは全部はカートリッジを通って流れる。投与セットはさらにソケットの下流に、入口および出口を有し、そしていくらかの空気を保持するための空気フラスコを含んでいる。カートリッジがソケット中へ嵌められる時、カートリッジはソケットへ流入する液体によって自動的に充填される。カートリッジ内の空気は空気フラスコへ下流に流れるが、しかしそれ以上下流に患者へは流れない。

【００３４】好ましい具体例においては、空気フラスコは患者にむかって下流へ流れるすべての液体は当該障壁を通って流れなければならない、液体中の粒子全部を除去するフィルターとして役立つ粒状物障壁を含んでいる。

【００３５】本発明の投与セットは、空気フラスコ内の正しい液体レベルにおいて投与セットの作動を提供する、空気フラスコ上の最低および最高液体レベル指示を含んでいる。

【００３６】空気フラスコの代りに前記ソケットまたはカートリッジチャンバーの下流に前記液体導管中にバクテリア阻止空気排気口を備えてもよい。ソケットは流体導管の上流および下流部分へ接続に適した入口および出口と、カートリッジの２本のカニューレにより刺通される刺通部位と、そして刺通部位に関して並べられ、そのため刺通部位を通ってソケットへ侵入するカニューレの一方の外側と液密に係合するソケット内の弾力性ブッシングとを含んでいる。この態様で、ソケットは患者へ放出されるすべての液体が有益な剤を含有するカートリッジがソケットへ接続されるとき最初にそれを通って流れることを強制する。

【００３７】カートリッジは有益な剤のためのチャンバーと、そして該チャンバーを閉鎖するための好ましくは刺通し得る閉鎖手段を含んでいる。カートリッジをソケットの上に取り付け、そしてソケットとチャンバーとの間の選択的流体連通を提供するためのアダプター手段がチャンバーのまわりに取付けられる。

【００３８】該アダプター手段はさらに、チャンバーおよびソケット刺通手段を含んでいる流路手段を含んでいる。該流路手段はチャンバー中の入口通路と、そして別にチャンバーの外への出口通路を含んでいる。

【００３９】チャンバーおよびアダプター流路手段は、チャンバーをチャンバー刺通手段で選択的に刺通し、それによってチャンバー入口通路および出口通路を開いた連通に置くように、相対的にスライド自在である。

【００４０】カートリッジは、チャンバー刺通手段が実際にチャンバーを刺通し、そしてカートリッジ刺通手段がカートリッジを刺通した時、入口および出口流路が各自チャンバー内へ延び、出口流路が入口流路より高い高度に配置されるように設計される。これはチャンバー内の液体と有益な剤との効果的な混合を生じ、そして危険なほど高濃度の薬剤が患者へ放出されることを防止するのを助ける。好ましい具体例においては、カートリッジは剛直なシリンダーと、この剛直シリンダーを横切って取付けられたベースプレートと、そしてこのベースプレートを通過して取り付けられ、剛直シリンダーと実質上同軸方向にベースプレートの少なくとも片側において剛直シリンダー内部へ延びている第１および第２の中空カニューレを含んでいる。

【００４１】中空カニューレの各自はベースプレートの両側において延びている。各自はとがった第１および第２の端を含み、そのためカニューレの両方が有益な薬剤を収容しているチューブ状チャンバーを閉鎖している刺通し得るストッパーと、そしてカートリッジ収容ソケットの刺通部位の両方を刺通する。第１の中空カニューレはベースプレートの両側において第２のカニューレよりも短い。有益な薬剤を含有するチューブ状チャンバーは剛直シリンダー内にスライド自在に装着される。チューブ状チャンバーは、中空カニューレによりストッパーが刺通されていない第１の位置から、第１および第２のカニューレの両方が刺通し得るストッパーを刺通した第２の位置へスライドすることができる。

【００４２】本発明の他の一具体例においては、カートリッジチャンバーは有益な剤を当該障壁とそしてチャンバー閉鎖具との間に保持する粒状物障壁を含んでいる。より長い第２の出口流路手段がカートリッジチャンバー中へ挿入される時粒状物障壁を刺通する。

【００４３】詳細な説明

図１を参照すると、大容量非経口液容器２４のような医療用液源内に貯蔵されている医療用液体２２を患者２６へ放出するための投与セット２０が図示されている。投与セット２０は例えば可撓性ポリ塩化ビニルチューブ製の流体導管２８を含んでいる。標準的な静脈内投与セットスパイク３０のような上流接続手段が流体導管２８の上流端に取付けられる。スパイクは容器投与ポート３２の膜を刺通するのに適している。

【００４４】流体導管２８は流体導管２８の下流端に装着されたルーアテーパー３４のような下流接続手段を含んでいる。ルーアテーパー３４は標準的技術に従って静脈カテーテル３６へ接続することができる。

【００４５】投与セット２０は、注射部位３８を通って針によって医療用液体を注入するための標準的な刺通し得る注射部位３８をさらに含むことができる。投与セット２０は流れ導管２８のまわりに装着した標準的ローラークランプ４０のような流量制御手段をさらに含むことができる。

【００４６】投与セット２０は図２に詳しく示した独特なソケット４２をさらに含んでいる。ソケット４２は１９８４年１２月３日に出願された米国特許出願第 721,991号に開示されているソケットの改良である。ソケット

４２は流体導管に沿って装着され、そして有益な剤を収容している図４ないし図９、図１０に示した別体のカートリッジ４４を収容するのに適している。カートリッジがソケット上に装着される時、流体導管２８を通ってソケット４２中へ流れる医療用液体源容器２４からの少なくとも一部、好ましくは全部の液はソケットの外へ患者へ向かって下流へ送られる前にカートリッジを通って流れる。

【００４７】ソケット４２の下流には図１，３，７，８および９に示した空気フラスコ４６がある。後で詳しく説明するように、空気フラスコ４６は、カートリッジを投与セット２０のソケット４２上へ装着する時カートリッジ４４の自動的プライミングを許容する。空気フラスコ４６はカートリッジ４４内に配置された空気を吸収し、該空気が患者へ向かって下流へ通過することを防止する。

【００４８】図３を参照すると、空気フラスコ４６は上流流体導管２８ａへ装着されそしてそれから流体を受け取る入口４８を含んでいる。空気フラスコ４６は下流流体導管２８ｂへ装着されそしてそれへ移行する出口５０を含んでいる。入口および出口は干渉嵌合、溶剤接着等によって流体導管２８へ装着することができる。空気フラスコはソケット４２の下流へ装着される。

【００４９】好ましい具体例においては、空気フラスコ４６は入口および出口端キャップ５２，５４をそれぞれ含み、その間にポリ塩化ビニルのような好ましくは光学的に透明な可撓性材料の円筒形側壁５６が装着される。側壁５６および端部キャップ５２，５４は流体導管２８の内径より大きい断面直径を有する空気チャンバー５８を形成し、そのため入口４８に隣接した液滴形成オリフィス６０から空気チャンバー５８へ入る液体は出口５０へ向かって落下する。空気フラスコ４６はこのため投与セット２０内の空気の収集容器を提供する。

【００５０】空気フラスコ４６は出口５０近くのプラスチックリング６４内に装着された粒状物スクリーンのような粒状物障壁６２をさらに含んでいる。粒状物障壁は実際には約０．２ミクロンの呼び孔径を有する滅菌フィルターでよい。呼び孔径は約２０ミクロンの呼び孔径を有する大粒状物障壁のように、もっと大きくてもよい。好ましい具体例においては、呼び孔径は約１０ミクロンである。スクリーンはイリノイ州ヘブロンのフィルター、テックによって供給されるようなナイロンメッシュ材料でよい。粒状物障壁６２は空気フラスコ４６を通過するすべての液体が粒状物障壁６２を通過しなければならないように流路に対し横に装着される。

【００５１】粒状物障壁６２は空気フラスコ４６内に配置する必要はないが、しかし障壁は挿入したカートリッジを出るすべての液体が粒状物障壁を通過するようにソケットの下流に装着されなければならない。また、ソケット４２，空気フラスコ４６および粒状物障壁６２は、

例えば上流流体導管２８ａによって分離されるのではなく、単一ユニットとして構成することも可能である。

【００５２】好ましい具体例においては、空気フラスコ４６は最低液体レベル指示６６および最高液体レベル指示６８を含み、それらは例えば空気フラスコ４６の外周のまわりの線よりなることができる。空気フラスコ４６中の液体レベルは、好ましくはカートリッジ４４のソケット４２内への挿入直前に最低および最高液体レベル指示の中間のどこかでなければならない。

【００５３】改良されたソケット４２は流体導管２８へ接続されたソケット入口７０およびソケット出口７２を含んでいる。空気フラスコ４６はソケット出口７２の下流に配置される。

【００５４】ソケット４２は、上方および下方取付具それぞれ７４，７６を含んでいる。下方取付具７６は出口７２と、そして入口７０と流体連通にある上流端および出口７２と流体連通にある下流端をもっている流体受入れセグメント７８を含んでいる。

【００５５】刺通し得る部位８０がソケット内に装着され、上方および下方取付具７４，７６間に捕捉される。刺通し得る部位８０は刺通し得る主本体部分８２と、そして主本体部分８２の外周のまわりを延びるリング状延長部分８４を含んでいる。リング状延長部分８４は拡大外周をさらに含んでいる。

【００５６】上方および下方取付具７４，７６は両方で、上方および下方取付具がその間に刺通し得る部位８０を固着態様に捕捉するように、拡大外周８６を含んでいるリング状延長部８４に実質上対応し、それを収容する環状みぞを形成する。部位８０はソケット４２を分解することなしには除去することができない。上方および下方取付具７４，７６は接着剤、超音波シーリング等によって接合することができる。この部位は、ソケット４２および投与セット２０の使用可能寿命の間めいめい２本の刺通カニューレを有する複数のカシートリッジ４４が繰り返して挿入され、部位から引抜かれるため、ソケット内にしっかりと維持されることが重要である。流体受入れセグメント７８は刺通し得る部位８０の下にそれと一般に同軸な先細部分９０を含んでいる。先細部分９０は弾力性ブッシング９２中への針ガイドとして役立つ。

【００５７】弾力性ブッシングは好ましくはポリイソプレンのようなエラストマーでつくられる。弾力性ブッシング９２は狭い貫通ボア９４を形成する。弾力性ブッシング９２は刺通し得る部位８０に関して並んで配置され、そのため貫通ボア９４は先細部分９０と実質上同軸である。

【００５８】図４ないし９へ転ずると、薬剤または他の有益な剤をソケット４２において流体導管２８中へ該剤を患者へ放出のため導入するためのカートリッジ４４が図示されている。

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【００５９】カートリッジ４４は剛直なシリンダー９６と、そして剛直シリンダーを横切って装着されているベースプレート９８を含んでいる。第１および第２の中空カニューレそれぞれ１００，１０２がベースプレート９８を通って装着され、そしてベースプレート９８の少なくとも片側において剛直シリンダー９６と実質上平行にその内部へ延びている。中空カニューレ１００，１０２の各自はベースプレート９８の両側に延びている。第１の中空カニューレ１００は刺通し得るストッパー１０４を刺通するのに適したとがった第１の端１００ａを含んでいる。第１の中空カニュレ１００はまたとがった第１の端１００ａの反対にとがった第２の端１００ｂを含んでいる。同様に、第２の中空カニューレ１０２は刺通し得るストッパー１０４を刺通するのに適したとがった第１の端１０２ａを含んでいる。第２の中空カニーレ１０２はまたとがった端１０２ａの反対側に第２のとがった端１０２ｂを含んでいる。第２の中空カニューレ１０２は第１の中空カニューレ１００よりもベースプレートからその両側において長い距離を延びている。

【００６０】カートリッジ４４は、乾燥した粉末薬剤のような有益な剤１０８を収容しているチューブ状チャンバー１０６をさらに含んでいるが、該剤は液体でもよい。前に述べた刺通し得るストッパー１０４または他の閉鎖手段がチューブ状チャンバー１０６を閉鎖する。

【００６１】図６を参照すると、刺通し得るストッパー１０４はチューブ状チャンバー１０６の口１１０内に装着される。ゴム製のストッパー１０４は口１１０およびストッパー１０４の周縁のまわりの金属バンド１１２によって標準的薬剤バイアルのストッパーの固着に類似した態様でチューブ状チャンバー内に固着することができる。チューブ状チャンバー１０６は、ストッパー１０４がベースプレート９８に対面するように剛直シリンダー９６内にスライド自在に装着される。チューブ状チャンバー１０６は剛直シリンダー９６から延びる舌１１４によってシリンダー９６からの完全係合に保たれている。舌１１４は、図６に図示するようにチューブ状チャンバー１０６の側壁から外側へ延びているストッパー１０４および金属バンド１１２アセンブリと係合する。刺通し得るストッパー１０４はチャンバー１０６の内部へ面する円錐径空間１１６を含むことができる。刺通し得るストッパーの代わりに、他の刺通し得る閉鎖手段を設けることができる。

【００６２】カートリッジ４４が例えば図４，６および７に示した第１の位置にある時、ゴム製のストッパー１０４は第１または第２の中空カニューレ１００，１０２のどちらによっても刺通されていない。好ましい具体例においては、刺通し得るストッパー１０４はチューブ状チャンバー１０６が第１の位置にある時第１および第２のカニューレ１００，１０２から離され続ける。

【００６３】第１および第２のカニューレ１００，１０２は流路手段を構成する。短い第１の中空カニューレ１００はチューブ状チャンバー１０６中への入口通路を提供する。長い第２のカニューレ１０２はチャンバー１０６からの出口通路を提供する。流路手段は、カートリッジ４４をソケット４２の上に装着するのに適した、剛直シリンダーを含むアダプター手段の一部を形成する。アダプター手段はチャンバー１０６に関してスライドする。後で他の具体例に見られるように、中空カニューレ１００，１０２は剛直シリンダー９６内をスライドし得る。換言すれば、チューブ状チャンバー１０６およびアダプター手段は相互に関して選択的にスライドし得る。

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【００６４】アダプター手段は、チャンバー１０６と反対のベースプレート９８の側から延び、そして実質上それと同軸のキーみぞ手段をさらに含むことができる。キーみぞ手段はソケット４２の上に嵌合するためのキーみぞスロット１２０を含んでいる比較的剛直なキーみぞ壁１１８を含むことができる。キーみぞ壁１１８はまたソケット４２の外側に装着した対応する縦キー１２４と係合のための１本または２本以上の縦に形成したみぞ１２２を含むことができる。キーみぞ手段は、ソケット内の第１および第２の中空カニューレ１００，１０２の適切な配置を含む、カートリッジ４４の関連するソケット４２との適切な係合を確実にする。

【００６５】カートリッジ４４のチャンバー１０６は例えば図４に示した第１の位置から、刺通し得るストッパー１０４がストップとして役立つベースプレート９８へ当接するまで、チャンバー１０６を剛直シリンダー９６内で下方へ押すことによって得られた図５に示した第２の位置へスライドすることができる。この位置において、第１および第２のカニューレ１００、１０２は刺通し得るストッパー１０４を刺通しており、そのため第１および第２のカニューレ１００、１０２のとがった中空端１００ａ，１０２ａはチャンバー１０６内部と連通にある。第２のカニューレ１０２の端１０２ａはチューブ状チャンバー１０６の深い内部にあり、好ましくはチャンバー１０６の頂端１２６の近くにある。第１のカニューレ１００のとがった中空端１００ａは、好ましくはストッパー１０４によって形成された中空円錐形部分１１６内のように、チューブ状チャンバー１０６内に丁度ある。

【００６６】作動において、カートリッジ中の有益な剤１０８が患者へ放出される前に、本発明の投与セット２０は図１に図示するように医療用液体容器２４と患者２６との間に開いた流体通路を設けることによって作動する。液体２２は容器２４から投与ポート３２およびスパイク３０を通って流れる。液体は流体導管２８を通り、そしてソケット入口７０，流体受け入れセグメント７８，先細部分９０，貫通ボア９４および出口７２をその順序に通ってソケット４２を通って流れる。液体は接続導管２８を通り、液滴形成具６０を通って空気フラスコ

４６中へ流れる。空気は空気フラスコ４６内にたまり、液体はフラスコ出口５０を通り、下流導管部分２８ｂを通り、ルーアコネクター３４および静脈カテーテル３６を通って患者中へ下流へ流れ続ける。

【００６７】投与セット２０が患者２６と連通に置かれる前に、流体導管２８がプライミングされ、すなわち空気が排除される。これは患者へ接続する前に液体がセットを通って流れることを許容することにより、既知の態様で実施される。

【００６８】液体レベルが最低および最高指示線６６，６８の間になるように空気フラスコ４６内のレベル１２８まで液体レベルを上げるため、空気フラスコ側壁５６を標準的態様で大部分の滴下室のように圧迫し、解放することができる。

【００６９】患者へ薬剤のような有益な剤１０８を放出することを望む時、その中に有益な剤１０８をその中に持っているカートリッジ４４がソケット４２の上に装着される。図７はカートリッジの作動前およびそれがソケット上に装着される前のカートリッジ４４およびソケット４２を図示する。

【００７０】カートリッジ４４は図４および７に示したように、チャンバー１０６が第１の位置にある状態で看護婦または医療人へ提供される。カートリッジ４４は単に剛直シリンダー９６を握り、そして親指でチャンバー１０６の頂部１２６を下方へ押すことによって作動される。これは最初に第２のカニューレ端１０２ａそして次に第１のカニューレ端１００ａを刺通し得るストッパー１０４を通って押し込む。チューブ状チャンバー１０６はそれ以上の運動が刺通し得る閉鎖具１０４とベースプレート９８との接触によって制限されるまで下方へ押される。この第２の位置は図５に図示されている。

【００７１】今や第２の位置にあるカートリッジ４４は、次に図８に図示するようにソケット４２の上に装着される。第１および第２のカニューレ１００，１０２がソケット内の特定位置に配置されることが重要である。これはその中にキーみぞスロット１２０を有するキーみぞ壁１１８により、ソケット４２上の上方取付具７４のブリッジ１３０の上をスロット１２０が案内されることにとより提供され、そしてさらにソケット４２のまわりに装着された複数の縦キー１２４の上に嵌合するキーみぞ壁１１８中の縦に形成したみぞ１２２によって提供される。好ましい図示した具体例においては、キーみぞ壁１１８はソケット上の３本の縦キー１２４と嵌合する３本の形成したみぞ１２２を含んでいる。

【００７２】図９を参照すると、カートリッジ４４は片手でソケット４２をハンドル１３２において、そして他方の手で剛直シリンダー９６を握り、そして第２のカニューレの第２の端１０２ｂがそして次に短い第１のカニューレの第２の端１００ｂが両方とも刺通し得る部位８０の主本体部分８２を刺通するようにカートリッジ４４を下方へ押すことにとより、図８に示した態様にソケット４２の上に容易に装着される。カートリッジ４４は下方へ押され続け、そのため第２の中空カニューレ１０２が貫通ボア９４へ入り、そして第２の中空カニューレ１０２の外周のまわりにブッシング９２により液密に係合される。ベースプレート９８が取付具７４の頂部に当接し、カートリッジ４４のそれ以上の下降運動を制限した後に適切な装着が発生する。

【００７３】図９に示すようにカートリッジ４４とソケット４２が係合した時、入口７０においてソケットへ流入する液体２２は流体受入れセグメント７８を通って流れる。弾力性ブッシング９２は第２の中空カニューレ１０２のまわりをシールしており、液体２２が直接下流へ通過することを防止する。その代わりに、液体２２は第１のカニューレ１００の第２の端１００ｂへ入り、そしてカニューレの第１の端１００ａにおいてチューブ状チャンバー１０６へ入る。

【００７４】液体２２がチャンバー１０６内で上昇するとき、チャンバー１０６内の残存空気は第２のカニューレ１０２を通って下流へ押出される。空気は液滴形成器６０を通って空気フラスコ４６へ入り、フラスコ４６内にたまる。図１に図示した最初の液体レベル１２８は線１３４によって指示したような新しいレベルへ下降する。液体レベル１２８は、空気がカートリッジ４４を出て行くとき、空気フラスコ４６内の液体レベルが空気が捕捉されそして患者へ向かって下流へ押し流されることがあるフラスコ出口５０へ下降しないように、カートリッジ４４の投与セット２０中への挿入前に最低液体レベル指示ラインより上でなければならない。カートリッジ４４のプライミング後の液体レベルは最低液体レベル６６より下でよいが、しかしカートリッジ４４の挿入前に最低ライン６６より上であれば、液体レベル１３４は出口５０より低くは決してならない。

【００７５】最高液体レベル指示６８は、液滴形成器６０を通って空気フラスコ４６へ入る液滴が標準的態様でなおカウントできるような最高液体レベルのためのガイドとして役立つ。

【００７６】チューブ状チャンバー１０６内の液体レベルは第２のカニューレの中空のとがった端１０２ａに達するまで上昇し続け、その時液体２２は第２のカニューレ１０２を通り、第２の端１０２ｂを通って下流へ、そして液滴形成具６０を通って空気フラスコ４６中へチャンバー１０６から流出し始める。チャンバー１０６を出て行く液体は患者へ放出のためそれと混合された有益な剤１０８の適切な濃度を有する。第１および第２のカニューレ１００，１０２によってチャンバー１０６内に形成された上方液体流路は、カニューレ端１０２ａにおいて出て行く液体２２内の薬剤濃度が患者への局部毒性を発生させるほど高くないように、チャンバー１０６内で密度勾配を形成する。局部毒性は放出液体中の薬剤濃度

が高すぎる時静脈注射部位近くに静脈刺激が発生し得る状況である。

【００７７】単位時間当たり患者への薬剤放出量は、典型的な液体流量において一般に該流量に無関係である。このことは極めて高い流量において、単位時間あたり患者へ放出される薬剤の総量は患者へ全身毒性を発生させるほど高くないことを意味する。換言すれば、患者はあまりに短い時間内に体内へ多すぎる薬剤を導入されないであろう。

【００７８】低い液体流量においては、単位時間あたり患者へ放出される薬剤の割合は投与セット２０を通る液体流量に一層依存するようになる傾向にある。チャンバー１０６を出て行く液体２２内の薬剤濃度の上限は二つの主の理由のため安全最高へ制限されると信じられる。カラム状チューブ状チャンバー１０６内に形成された密度勾配は、第２のカニューレ１０２への侵入点における液体２２の濃度はチューブ状チャンバー１０６内のどの高さ中最低であることを意味する。第２に、投与セット２０を通る液体流量が減り、通常患者へ許容できない高い薬剤濃度の危険を増すとき、チャンバー１０６内に形成された混合する液体乱流の量も減り、ストッパー１０４の区域から第２のカニューレ１０２の第１の端１０２ａまでの密度の差が大きくなるように密度勾配を拡大する。

【００７９】上述の異なる液体流量は可能性だけであることに留意すべきであり、好ましい作業態様においては、看護婦または他の医療人は流量制限手段（ローラークランプ４０またはぜん動ポンプのような）によって許容し得る流量をセットし、少なくとも有益な剤１０８の放出後まで流量を再度調節しないであろう。

【００８０】独特のカートリッジ４４およびソケット４２を備えた投与セット２０は治療上有益な量の有益な剤１０８を治療上許容できる時間内に放出することができる。例えばチャンバー１０６内のアンピシリンの１ｇ投与量は１２０ｍｌ／時間の流量において約３０分で放出することができる。

【００８１】好ましい具体例においては、チューブ状チャンバー１０６は約１０ｍｌの容積を有し、そして約３ないし４ｍｌまでの空気を含むことができる。チューブ状チャンバーの内径は約０．４インチ（１．０６１ｃｍ）である。口１１０から頂部１２６までのチューブ状チャンバーの高さは約２インチ（５．０８ｃｍ）である。１９８４年１２月３日に出願された米国特許第 721,991号に記載されているように、刺通し得るストッパー閉鎖具１０４の中空円錐形部分１１６は混合を助け、第１のカニューレ１００の第１の端１００ａにおける液体２２の侵入点において追加の乱流を形成するものと信じられる。チャンバー１０６の比較低長い狭い形状は有益な剤１０８の液体２２との混合を助けるものと信じられる。液体２２は例えば５％デキストロース溶液でよい。

【００８２】チューブ状チャンバー１０６の寸法を変えることにより、有益な剤１０８の放出プロフィルを変えることができることに注目すべきである。例えば、チューブ状チャンバーの内径を拡大することにより、チャンバー１０６内の剤１０８を患者２６へ放出するのにより長くかかるであろう。同様に、チャンバー１０６を長くすることは、もし第２のカニューレ１０２を長いチャンバー１０６内で延長すれば放出時間を延長するであろう。

【００８３】本発明のソケット４２とカートリッジ４４を利用する有益な薬剤１０８を放出するための他の投与セット１３６が図１０に図示されており、その中では同様なエレメントは同じ番号で述べられている。投与セット１３６は液滴をカウントするための標準的可撓性プラスチック滴下室１３８を含み、セット１３６のプライミングを助ける。ソケット４２は滴下室１３８の下流に装着される。

【００８４】空気フラスコ４６は含まれていない。カートリッジ４４がソケット４２上に装着される時一つまたはそれ以上のカートリッジ４４から空気を排出するための他の手段が設けられる。この目的のため、ソケット４２の下流に空気排気口１４０が設けられる。空気排気口はバクテリア阻止疎水性膜を含むことができる。空気排気口１４０は０．２２ミクロン滅菌フィルター１４２のような液体フィルターの一部とすることができる。そのようなフィルターは本発明の譲受人へ譲渡されたフレデリックらの米国特許第 4,568,366号に開示されている。このフィルター１４２は液体２２からどのような粒状物をも除去する親水性作用空気繊維フィルターエレメントを含んでいる。

【００８５】図１１および図１２を参照すると、チャンバー１０６，剛直シリンダー９６およびキーみぞ壁１１８に類似したチャンバー１０６’，剛直シリンダー９６’およびキーみぞ壁１１８’を含んでいるカートリッジ４４’が図示されている。そのまわりに金属バンド１１２’を含んでいるストッパー１０４’は有益な剤１０８を保持するチャンバー１０６’へ装着され、それを閉鎖する。舌１１４’はチューブ状チャンバー１０６’を剛直シリンダー９６’との機能的係合に保持する。

【００８６】剛直シリンダー９６’を横切って延びるベースプレート９９は第１および第２のカニューレそれぞれ１００’および１０２’を含んでいる。

【００８７】この具体例のカートリッジ４４’はベースプレート９９へ除去自在に固着されたカートリッジから除去し得る針カバー１０１を含んでいる。カートリッジから除去し得る針カバー１０１は、最初にストッパー１０４’をカニューレ１００’，１０２’で刺通することなくカートリッジ４４’をソケット４２へ接続するのを防止する主目的を有する。換言すれば、針カバー１０１

は、カートリッジ４４’がソケット４２上へ装着できる前に、カートリッジチャンバー１０６’が図１１に示した第１の位置から図１２に示した第２の位置へ動かされなければならないことを確実にする。カートリッジ４４が尚早で、すなわちカートリッジ４４が第２の位置へ動かされる前に装着されれば、投与セットを通って流れる液体はカートリッジチャンバー１０６’へ入ることなく第１のカニューレ１００’の第１の端１００ａ’の外へこぼれるであろう。

【００８８】キーみぞ壁１１８’の比較的小さい寸法のため、針カバー１０１はそれが図１１に示すように配置されている時カートリッジ４４’から除去することができない。

【００８９】針カバー１０１は各ピンの先端において減少したピン部分１０５を含んでいるピン１０３を含んでいる。ピンは円形の針カバーベース１０９から延びている。ベースプレート９９はその中に針カバーベース１０９を収容する環状リング様みぞ１０７を含んでいる。開口１１１がリング様みぞ１０７に沿った点においてベースプレート９９を通って延び、そして好ましくは干渉嵌合においてピン１０３を収容し、そのため針カバー１０１はベースプレート９９から不注意に外れないであう。

【００９０】チューブ状チャンバー１０６’が上のカートリッジ４４およびチャンバー１０６に関する説明に従って図１２に図示した第２の位置へ動かされる時、刺通し得るストッパー１０４’または他の閉鎖手段はベースプレート９９と当接する前にピン１０３と係合する。ピン１０３に対するこの下降運動は針カバー１０１を図１１に示した干渉嵌合の外へ強制する。針カバー１０１の先端１１３は今やキーみぞ壁１１８’の端を越えて突出し、その先端１１３を握って人力で除去することができる。その代わりに、狭いピン部分１０５は今や開口１１１内にあるので、ベースプレート９９と針とカバー１０１との間に干渉嵌合がもはや存在せず、そのため針カバー１０１は今や好ましくはカートリッジ４４’の外へ単に落下するであろう。

【００９１】針カバー１０１を除去した後、カートリッジ４４’はカートリッジ４４に関し上で記載した態様でソケット４２へ固着される。

【００９２】カートリッジ４４’のソケット４２上への不適切な装着の防止に加え、針カバー１０１はまたカニューレ１００および１０２の接触汚染を防止する。

【００９３】図１３を参照すると、カートリッジの代替具体例１４４が図示されている。類似のエレメントは同じ参照番号を保持する。この具体例においては、カートリッジ１４４はなお剛直シリンダー９６およびキーみぞ壁１１８を含んでいる。チューブ状チャンバー１４６はストッパー１０４のような刺通し得る閉鎖具によって閉鎖されている。チャンバー１４６は粒状物障壁を装着するための段１４８を含んでいる。粒状物障壁は、段１４８においてヒートシール等によって固着されたプラスチックリング１５２内に装着された例えば５ミクロンナイロン網を含むことができる。カートリッジ１４４を使用する前に、有益な剤１０８はストッパー１０４と網１５０の間に捕捉され続ける。網１５０の上方側のチャンバー１４６頂端部分１５４内には有益な薬剤１０８はない。図３の空気フラスコ４６内の粒状物障壁に関する呼び孔径および材料についての説明は粒状物障壁１５０にも同様にあてはまる。

【００９４】カートリッジ４４と同様に、カートリッジ１４４は剛直シリンダー９６内にスライド自在に収容される。このカートリッジは図１３においてチャンバー１４６が第２の位置にあり、第１および第２のカニューレ１００，１０２がストッパー１０４を刺通し、そしてカートリッジ１４４が放出液体２２中の有益な剤の放出のためソケット４２上に装着されて図示されている。作動中、チャンバー１４６が第２の位置へスライドする時、第２の中空カニューレ１０２は粒状物障壁１５０を刺通し、そして有益な剤が貯蔵されていないチャンバー１４６の頂端部分１５４中へ延びる。液体が第１のカニューレ１００を通ってチャンバー１４６へ入るとき、有益な剤１０８は前に記載した具体例のように液体と混合する。しかしながら粒状物障壁により、頂端部分１５４へ入って行く有益な剤は放出液体２２中に既に溶解している。その中で混合された有益な剤１０８を有する液体２２は第２のカニューレの第１の端１０２ａのレベルまで上へ流れ、そのとき患者へ向かって下流へ放出される。

【００９５】有益な剤１０８をチューブ状チャンバー１４６の下方部分に捕捉することにより、より良い混合作用が実際に発生し得るものと信じられる。カートリッジ４４，４４’と同様に、カートリッジ１４４は第１の中空カニューレの第１の端１００ａがチャンバー１４６内へ少しだけある時に最良に作動する。

【００９６】図１４および１５を参照すると、図１４にその中に有益な剤１６４を有する標準的薬剤バイアル１６２のようなチャンバーをソケット４２へ接続するためのアダプター１６０が図示されている。アダプター１６０はバイアル１６２の口１７０とのスナップ嵌合係合のため拡大したバイアル端１６８を備えた中空剛直シエル１６６を含んでいる。バイアル１６２はその中に刺通し得るゴムストッパー１７２を含んでいる。拡大したバイアル端１６８は突起１７４を含むことができる。同様なステップ嵌合構造を示す復元器具は、１９８４年８月２１日に出願されたウイリアム、アール、アールトらの現在許可された米国特許出願第 642,908号に開示されている。アダプター１６０は中空剛直シエル１６６内にスライド自在に装着されたスライディングプレート１７６を含んでいる。スライディングプレート１７６はシエル壁内のくぼみ内にスライド自在に収容された突起１７８を含んでいる。弾力性材料および突起１７８は、運動が意

図されるまでスライディングプレート１７６を静止して保つことを意図する。

【００９７】拡大したバイアル端１６８へ面する第１のとがった中空端１８０ａと、拡大端１６８と反対に面する中空のとがった端１８０ｂを有する第１の中空カニューレ１８０がスライディングプレート１７６内に装着されている。

【００９８】また拡大した端１６８へ面する中空のとがった第１の端１８２ａと、そして拡大した端１６８と反対に面する第２の中空なとがった端１８２ｂを有する第２の中空カニューレ１８２もスライディングプレート１７６へ装着される。スライディングプレート１７６はシエル壁内のハンドル収容スロット１８６においてシエル１６６の外へ突出するハンドル部分１８４を含んでいる。剛直シエル１６６はソケット４２のブリッジ１３０のまわりに装着のためソケット収容スロット１８８を含んでいる。

【００９９】第１の中空カニューレ１８０は薬剤バイアル１６２または他のチャンバー中への入口流路手段を含んでいる。第２の中空カニューレ１８２は薬剤バイアル１６２の外への別の出口流路を含んでいる。カニューレ１８０，１８２の第１の端１８０ａ，１８２ａは薬剤バイアル１６２のゴムストッパー１７２を刺通するためのチャンバー刺通手段を含んでいる。カニューレの第２の端１８０ｂ，１８２ｂはソケット刺通手段を含んでいる。

【０１００】作動において、看護婦または他の医療人は薬剤バイアル１６２をアダプター１６０の拡大した端部分１６８内に嵌合する。オペレーターは次にハンドル部分１８４を握り、そしてそれをスロット１８６内で動かし、それによりスライディングプレート１７６とそれに装着された針とを薬剤バイアル１６２へ向かって動かし、第１および第２のカニューレ１８０，１８２の両方でゴムストッパー１７２を刺通する。アダプター１６０は次にソケット４２のまわりに装着され、シエル１６６はそのまわりに嵌合し、第１および第２のカチューレ１８０，１８２が刺通し得る部位８０を刺通し、第２のカニューレ１８２がブッシング９２と係合する。

【０１０１】図１５を参照すると、図１４に示したアダプター１６０に類似したアダプターの代替具体例１９０が図示されている。ここではしかしながらスライディングプレート１９８から延びるハンドル部分１９６はバクテリア阻止疎水性膜および０．２２ミクロン滅菌膜フィルター１９４のような空気排出口１９２を含んでいる。第２の中空カニューレ２００は拡大したアダプター端部分１６８へ面するセグメント２００ａと、アダプター端部分１６８から反対に面するセグメント２００ｂの二つの別々のセグメントから形成されている。セグメント２００ａ，２００ｂはフィルター１９４を横断してハンドル部分１９６の内部を通って開いた連通にある。アダプター１９０の作動は、空気排出口１９２の存在がプライミング中薬剤バイアル内の空気に対し出口を提供することを除き、アダプター１６０の作動と同じである。粒状物障壁１９４もアダプター１９０内に装着され、粒状物が患者へ向かって下流へ行くのを防止する。

【０１０２】図２４および２５を参照すると、有益な剤１０８をその中に有するチューブ状チャンバー１０６がスライド自在にその中に配置されている剛直シリンダー９６を含んでいるカートリッジ３１０が図示されている。ベースプレート３１２はシリンダー９６を横切って延びる。各自チューブ状チャンバー１０６に面する第１のとがった中空端３１４ａ，３１６ａを含んでいる第１および第２の中空カニューレ３１４，３１６がベースプレート３１２内に配置されている。カートリッジ４４と同様に、カートリッジ３１０のチューブ状チャンバー１０６は第１および第２のカニューレとの非係合にある第１の位置から第１および第２のカニューレ３１４，３１６の第１の端３１４ａ，３１６ａがチューブ状チャンバー１０６のゴムストッパー１０４を刺通した図２４に図示した第２の位置へスライドする。カートリッジ３１０はチューブ状チャンバー１０６と反対のベースプレート３１２の側から延びるキーみぞ壁３１８を含んでいる。キーみぞスロット３２０がソケット３２４のブリッジ３２２のまわりに嵌合のためキーみぞ壁３１８内に形成される。キーみぞ壁３１８は１個以上の内部突起３２６を含んでいる。

【０１０３】カートリッジ４４と異なって、第１および第２のカニューレそれぞれ３１４，３１６の第２のとがった端３１４ｂ，３１６ｂはベースプレート３１２から同じ距離を延びることができる。ソケット３２４は投与セット２０のような投与セットの流体導管へ接続されたソケット入口７０およびソケット出口７２を含んでいる。ソケット３２４は入口７０と流れ連通にある上流端とそして出口７２と連通にある下流端を持っている流体受入れセグメント７８を含んでいる。

【０１０４】ソケット３２４はソケット４２中のブッシング９２のようなブッシングを含んでいないが、しかし後で詳しく記載するように、カートリッジ３１０とソケット３２４が完全に係合すれば、ソケットを通って流れるすべての液体は前に記載したカートリッジ４４およびソケット４２の場合のように、チューブ状チャンバー１０６を最初に通過しなければならない。

【０１０５】ソケット３２４は、ポリイソプレンのような弾力性の刺通し得る材料でつくった刺通し得るピストン様の注射部位３３８の拡大したその周縁３３６を含んでいるリング状延長部３３４に実質上対応しそしてそれを収容する環状みぞ３３２を形成する上方および下方取付具３２８，３３０を含んでいる。一つ以上の爪３４０がキーみぞ壁３１８上の内側突起３２６と係合のためソケット３２４の外側のまわりに設けられる。流出シール

３４２は下方取付具３３０の残部と同じ比較的剛直なプラスチック材料で下方取付具３３０内に成形することができる。流出シール３４２はカートリッジ３１０の第２の中空カニューレ３１６より大きい直径の流出通路３４４を形成する。

【０１０６】作動において、看護婦または他のオペレーターはチューブ状チャンバー１０６の頂部３４４を下方へ押し、それを第１の位置からストッパー１０４がベースプレート３１２に当接する図２４に図示した第２の位置へスライドさせる。図２４に図示するように、カニューレ３１４，３１６は両方とも部位３３８を刺通する。しかしながら図２４に図示するように、カートリッジ３１０はソケット３２４のまわりに完全に装着されない。図２４において、部位３３８はなおその平常な位置にある。入口７０へ流入する流体はチャンバー１０６へ入ることなく流出シール３４２のまわりを通過することによって出口７２を通って流れることができる。

【０１０７】カートリッジおよびソケットを完全に係合するため、看護婦または他のオペレーターは剛直シリンダー９６が図２５に示した完全に係合した位置へ達するようにさらに下方へ押す。ソケット３２４に関しカートリッジ３１０上へ下方圧力を加えることにより、中央の盛り上がり部分３４６が部位３３８を下方へおし、それを図２４に図示した平常位置から図２５に示した第２の変形位置へ下方へシフトさせる。部位３３８は部位のリング状延長部３３４に対し実質上互いに直角な方向に動く。図２５に図示した変形位置において、部位３３８はソケットの流出シール３４２のまわりをシールする。注射部位３３８の変形位置は係合突起３２６と爪３４０の相互嵌合によって維持される。

【０１０８】今や入口７０および流体受入れセグメント７８へ流入する流体は端３１４ｂを通って第１の中空カニューレ３１４中へと、そして有益な剤１０８を収容しているチャンバー１０６中へと必然的に向けられる。部位３３８上への圧力は部位３３８と流出シール３４２との間に効果的な液体シールを形成させる。液体は第２のカニューレ３１６を通ってチューブ状チャンバー１０６を出て行き、その後出口７２通ってソケットを出て患者へ向かって下流へ流れる。

【０１０９】カートリッジ３１０とソケット３２４の組合せは、一旦カートリッジがソケットのまわりに係合されれば単一流路を形成するためのブッシングの製造および組立ての必要を排除する。有益な剤が患者へ放出された後、オペレーターはカートリッジを除去することができ、そのとき部位３３８は図２４に示すその平常位置へ復帰し、そのため液体はソケットを通って直接流れることができる。その後カートリッジ３１０はソケット３２４を通って固着することができ、その時部位３３８は図２５に示す変形位置へ再度強制される。

【０１１０】図１６および１７を参照すると、同様なエレメントは同様な参照数字で述べられているカートリッジ２０２が図示されている。カートリッジ２０２はチューブ状チャンバー１０６および剛直なシリンダー９６を含んでいる。

【０１１１】ここでは、第２の中空カニューレ２０４はとがった第１の端２０６ａの下方およびベースプレート９８の上方に、カニューレ内に少なくとも１個のそして好ましくは複数のオリフィス２０６を含んでいる。オリフィスはレーザーの使用によって形成することができる。与えられた寸法のカートリッジ２０２をもって、オリフィス２０６の数、配置および寸法の変更は患者へ医療用液体２２と共に放出すべき有益な剤の濃度を変えるであろう。オリフィスの数、寸法および配置に応じ、液体中の薬剤の特定の区切られた濃度プロフィルが形成された。液体が第１のカニューレ１００からチャンバー１０６へ入るとき、液体レベルが上昇する。カートリッジ４４と同様に、チャンバー１０６の高さに沿って濃度勾配が発生し、薬剤または他の剤の濃度はストッパー１０４近くで最大であり、そして第２のカニューレの第１の端２０６ａ近くで最小である。種々のオリフィス２０６により、いくつかの濃度層がチャンバー１０６を出ることが許容されることができる。出口オリフィス２０６の寸法および間隔は次の濃度レベルの層がカートリッジを出る時を決定する。本明細書内に開示された本発明のカートリッジはこれらのオリフィス２０６なしで良好に作動するものと信じられるが、オリフィス２０６の使用はあるもっと放出が困難な薬剤について有用であるに違いない。

【０１１２】与えられた時間内に患者へ向かって下流へ放出される有益な剤の量は以下の式によって表すことができる。

$$DD = C_1 Q_1 + C_2 Q_2 \ldots\ldots C_N Q_N$$

ここでＤＤは単位時間内に放出される薬剤の量に等しく、C_N は流体レベルまたは層Ｎ中の薬剤濃度に等しく、そしてQ_N は与えられた単位時間内の液体レベルまたは層Ｎ中のオリフィス２０６を通って流れる流体の量に等しい。

【０１１３】特定のオリフィスについてのQ_N はそのオリフィスの寸法と、そしてカニューレ２０６の低い高度にあるオリフィスの数および寸法と、そして投与セットを通る液体流量とに依存する。各オリフィス２０６はカニューレ２０４上でそれと直接対向する同じオリフィスを持つことができる。もし与えられた高度にある、またはその下のオリフィス２０６によって許容される最大流出量がチャンバー１０６への液体流量より小さいならば、液体はチャンバー内の次に高いオリフィス２０６まで上昇するであろう。

【０１１４】図１８ないし２３、特に図１８ないし２０へ転ずると、流体導管中へ有益な剤を導入するためのカートリッジ２０８が開示されている。カートリッジ２０

８はその中に有益な剤２１４を持っているチャンバー２１２を形成する壁２１０を含んでいる。カートリッジ壁２１０は、本体部分２１６と、そして口２２０を形成する開いた端を持っている首部分２１８を含んでいるガラス薬剤バイアルでよい。刺通し得るストッパー２２２のような刺通し得る閉鎖手段が口２２０とカートリッジ２０８の首２１８内に装着される。ストッパー２２２はチャンバー外部へ面する外側面２２４とそして形成されたチャンバー２１２へ面する内側面２２６を含んでいる。

【０１１５】刺通し得るストッパー２２２は外側蓋部分２２８とそして狭い栓部分２３０を含むことができる。蓋部分２２８は口２２０の端部に当接し、栓部分２３０はチャンバー２１２の首部分２１８中へ延びる。

【０１１６】煙突状突起２３２は内側面２２６からカートリッジの長さに実質上平行な方向に、換言すれば刺通し得るストッパー２２２の蓋部分２２８に対して実質上直角方向に延びている。煙突２３２，栓部分２３０および蓋部分２２８はポリイソプレンのような材料の単一片から形成することができる。

【０１１７】閉鎖手段、この場合刺通し得るストッパー２２２は煙突２３２の内部２３４と整列した点と、そして内側面２２６の区域および煙突２３２の外部へ整列した点とにおいて刺通されるのに適している。これらの二つの点は参照数字それぞれ２３６および２３８によってマークされている。

【０１１８】好ましい具体例においては、カートリッジはカートリッジの口２２０および閉鎖手段のまわりに装着するのに適した流れコネクター２４０をさらに含んでいる。流れコネクターは、口２２０および刺通し得るストッパー２２２と密な相互嵌合のためその一端にある拡大したみぞ２４４を持っているスリーブ２４２のようなカートリッジ接続手段を含んでいる。

【０１１９】流れコネクター２４０はスリーブ２４２の他端２４８へ装着されたベース２４６を含む。ベース２４６はスリーブ２４２内に回転自在に装着されるのが好ましい。

【０１２０】流れコネクター２４０はベース２４６内に装着された第１および第２のカニューレ２５０，２５２を含む。第１および第２のカニューレは刺通し得るストッパーへ面した第１のとがった端２５０ａ，２５２ａを含んでいる。同様にカニューレはめいめいベース２４６の反対側で刺通し得るストッパーから下方へ延びる第２のとがった端２５０ｂ，２５２ｂを含んでいる。カニューレは煙突２３２の長さに対して実質上平行な、そして刺通し得るストッパー２２２の蓋部分２２８に対して実質上直角な方向に延びる。

【０１２１】流れコネクター２４０は、ベース２４６のストッパー対面側から延びている突出するキー２５４をさらに含んでいる。嵌合するキーみぞ２５６がストッパー２２２の外側面２２４内に配置される。キー２５４およびキーみぞ２５６の位置は勿論逆にすることができる。キーおよびキーみぞはベース２４６の中心の整列した中心を持つ半径によって区切られた円弧デザインを持つことができる。

【０１２２】カニューレの第１の端２５０ａ，２５２ａはベース２４６のチャンバー対面側から実質上同じ距離を延びる。好ましい具体例においては、カニューレの第２の端２５０ｂ，２５２ｂは、第２のカニューレの第２の端２５２ｂがベースのチャンバー遠方側から第１のカニューレ２５０より遠くへ延びるように配置される。

【０１２３】ベース２４６は、そのチャンバー遠方側から延び、第１および第２のカニューレを囲みそれから離れている延長壁２５８を含んでいる。延長壁２５８は、その中に形成されたスロット２６０を含む。延長壁２５８および第２の端２５０ｂ，２５２ｂ看護婦または他のオペレーターへの害を防止し、そしてカニューレの接触汚染を防止するために設けられたキャップ２６２によってカバーされる。

【０１２４】延長壁２５８中のスロット２６０はカートリッジ２０８の投与セット２０の流体導管２８中に装着されたソケット４２のようなソケットとの適切な係合を可能とするためのキーみぞ手段として役立つ。

【０１２５】作動において、看護婦または他のオペレーターは延長壁２５８からキャップ２６２を除去し、キー２５４およびキーみぞ２５６が嵌合するまで延長壁を回転し、その時延長壁２５８とベース２４６とは、中空カニューレがチャンバー２１２から離れている図１９に示した第１の位置から第１および第２のカニューレ２５０，２５２が閉鎖手段を刺通しそしてチャンバー２１２と流れ連通にある図２０に示した第２の位置へ中空カニューレが動くまで、刺通し得るストッパー２２２へ向かって押される。第２の位置において、第１のカニューレ２５０は煙突に対し外側の点においてストッパーの内側面２２６を刺通する。第２のカニューレ２５２はその第１の端２５２ａが煙突２３２内に配置されるようにストッパー２２２を刺通する。

【０１２６】カートリッジ２０８は次にスロット２６０をソケット４２のブリッジ１３０上に装着することにより図１に示したソケット４２のまわりに挿入される。この位置において第１および第２のカニューレ２５０，２５２は図９に示した第１および第２のカニューレ１００，１０２と同じ態様でソケット内に配置されるであろう。ソケットへ流入する液体は第１のカニューレ２５０を通ってチャンバー２１２中へ流入し、その中の有益な剤２１４と混合するであろう。液体が煙突２３２の頂部２６４のレベルを上昇する時、液体は第２のカニューレ２５２およびブッシング９２を通って患者へ煙突を流下するであろう。代わりに、ベース２４６のストッパー遠方側上のカニューレ２５０，２５２の長さは、カートリッジ２０８を図２４および２５に示したソケット３２４

と共に使用できるように変更することができる。

【０１２７】図２１ないし２３を参照すると、蒸気および空気に対し比較的不透過性の壁２６８と、そしてそれと共にチャンバー２７２を形成する刺通し得るストッパー２７０のような刺通し得る閉鎖手段を含んでいるなお他のカートリッジ２６６が開示されている。刺通し得るストッパー２７０は外側面２７６と、チャンバー２７２へ面する内側面２７８を含んでいる。

【０１２８】煙突２８０は内側面２７８からカートリッジの長さに実質上平行な方向に、換言すれば外側面２７６に対して実質上直角な方向に延びる。有益な剤２８２は煙突２８０自体内部のチャンバーに貯蔵される。ナイロンメッシュスクリーンのような約２０ミクロン以下の呼び孔径を有する粒状物障壁のような液体透過性障壁２８４が煙突２８０の頂部２８６に装着される。液体透過性障壁２８４はカートリッジ２６６がアダプター４２中へ差し込まれる時まで煙突２８０内に有益な剤を保持する。

【０１２９】好ましい具体例中のカートリッジ２６６はベース２９０を持っている流れコネクター２８８を備える。ベース２９０はチャンバー遠方側２９２とチャンバー対面側２９４とを含む。第１および第２のカニューレそれぞれ２９６，２９８がベース２９０中に取付けられる。延長壁３００がベース２９０のチャンバー遠方側２９２から延び、そして他のカートリッジに関して上で記載した態様でカートリッジ２６６をソケット４２上に装着することを可能にするスロット３０２を備える。

【０１３０】第１のカニューレ２９６の第１のとがった端２９６ａはベース２９０から第２の中空カニューレ２９８の第１の端２９８ａよりも短い距離を延びる。同様に第１の中空カニューレ２９６の第２のとがった端２９６ａはベース２９０のチャンバー遠方側から前記のカートリッジ４４と共に使用のため第２のカニューレ２９８の第２の中空端２９８ｂよりも短い距離を延びる。第２の中空カニューレ端２９６ｂ，２９８ｂの配置は図２４に図示したソケット３２４のようなソケットと共に使用するため変更することができる。

【０１３１】使用において、オペレーターはベース２９０のチャンバー対面側２９４が図２２に図示するようにストッパー２７０に当接するまで刺通し得るストッパー２７０を通過して第１および第２のカニューレ２９６，２９８を押す。

【０１３２】しかしながら第２のカニューレが煙突内に配置されている図１８ないし２０の具体例と異なって、図２１ないし２３に図示した具体例においては煙突２８０内に配置されるのは第１のカニューレ２９６である。有益な剤は煙突内に保持されているため、有益な剤と混合する液体の上への流路は煙突自体の内部に形成される。

【０１３３】最終的に液体は液体透過性障壁２８４に達し、煙突２８０の外側壁を流下する。その中に有益な剤を持っている液体は煙突２８０の外部のチャンバー２７２中に集まる。液体レベルはそれが第２のカニューレ２９８の第１の端２９８ａのレベルへ達するまで上昇し、その時液体は第２のカニューレ２９８中へそして患者へ向かって下流へ流れる。ソケット４２のまわりの流れコネクター２８８を含むカートリッジ２６６の装着は図２３に図示されている。

【０１３４】いくつかの具体例および特徴をここに詳細に記載し添付図面に示したが、特許請求した発明の範囲を逸脱することなく種々の他の具体例が可能であることが自明であろう。

【図面の簡単な説明】

【図１】空気フラスコおよびソケットを含んでいる投与セットの斜視図である。

【図２】図１に図示したソケットの部分拡大断面図である。

【図３】図１に図示した空気フラスコの部分拡大断面図である。

【図４】第１の位置にあるカシートリッジチャンバーを図示する、図１の投与セットと共に使用すべき有益な剤のためのカートリッジの側面図である。

【図５】カートリッジ部材をその第２の位置へスライドして動かした、図４のような側面図である。

【図６】カートリッジのための閉鎖具の部分断面図である。

【図７】カートリッジをソケット上へ取付ける前の投与セットの部分斜視図である。

【図８】ソケット上へ取付けたカートリッジを図示する図７に類似の図である。

【図９】ソケット、カートリッジおよび空気フラスコが流体連通にある、投与セットの部分断面図である。

【図１０】投与セットの他の具体例の側面図である。

【図１１】カートリッジチャンバーが第１の位置にある、カートリッジの他の具体例の断面図である。

【図１２】カートリッジチャンバーが第２の位置にある第９Ａ図のカートリッジの断面図である。

【図１３】カートリッジのなお他の具体例の断面図である。

【図１４】ソケットと、カートリッジの代替具体例の分解部分断面図である。

【図１５】ソケットと、カートリッジのなお他の代替具体例の分解部分断面図である。

【図１６】第２の流路手段の側壁に複数のオリフィスを含んでいるカートリッジの断面図である。

【図１７】図１６に図示した第２の流路手段の一部の拡大側面図である。

【図１８】指向された流路をその中に確立するするためカートリッジチャンバー内に煙突を含んでいるカートリッジの破断斜視図である。

【図１９】図１８のカートリッジの縦断面図である。

【図２０】チャンバーとアダプターとの間の流れ連通が確立された後の図１８のカートリッジの断面図である。

【図２１】その中に煙突を含んでいるカートリッジの他の具体例の分解縦断面図である。

【図２２】カートリッジチャンバーとアダプター間に流れ連通が確立された後の図２１のカートリッジの断面図である。

【図２３】ソケットへ固定した図２１のカートリッジの断面図である。

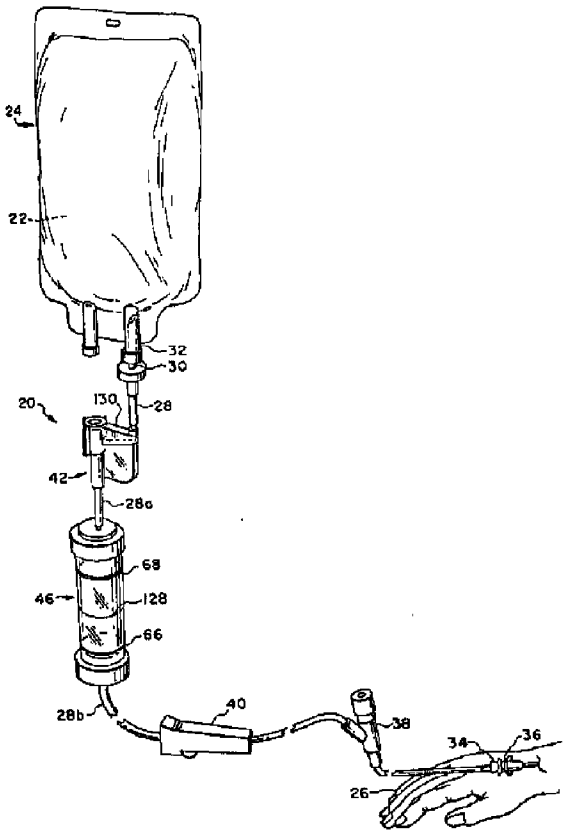
【図２４】ピストン状注射部位を有するソケット中へ挿入されているカートリッジの縦断面図である。

【図２５】ピストン状注射部位がカートリッジとソケットとの完全係合によってその第２の変形した位置へ動かされた、図２４に図示したカートリッジとソケットの部分断面図である。

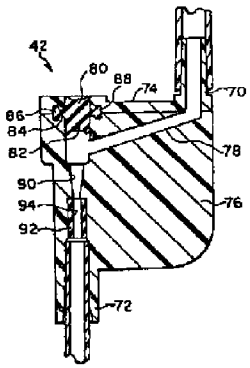
【符号の説明】

２０　投与セット
２２　医療用液
２４　非経口容器
２６　患者
２８　流体導管
３０　上流接続手段
３４　下流接続手段
４２　ソケット
４４　カートリッジ
４６　空気フラスコ
７０　ソケット入口
７２　ソケット出口
７８　液体受入れセグメント
８０　刺通部位
９６　剛直シリンダー
９８　ベースプレート
１００，１０２　中空カニューレ
１０４　刺通し得るストッパー
１０６　チャンバー
１０８　薬剤
１６０　アダプター
１６２　薬剤バイアル

【図１】



【図２】



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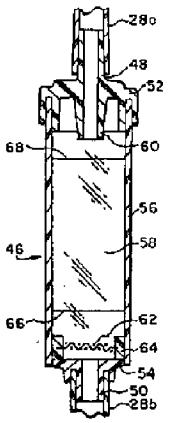

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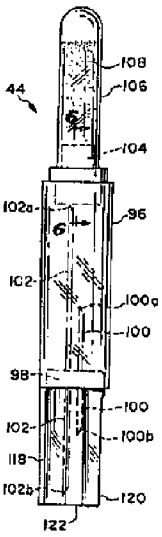

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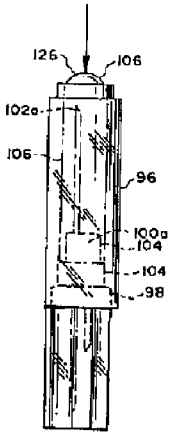

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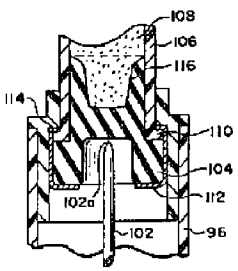

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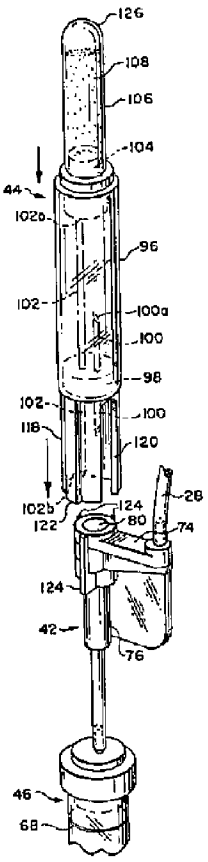

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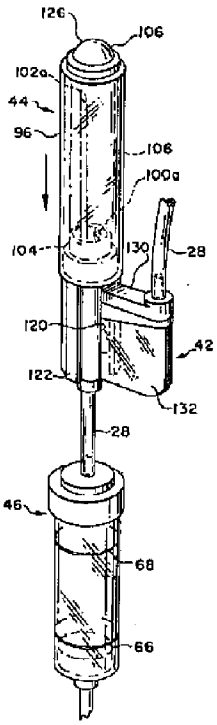

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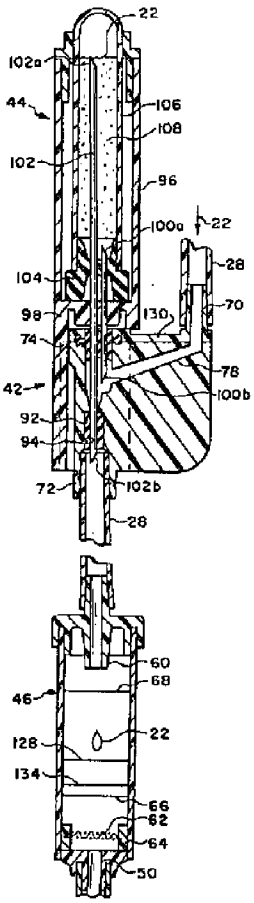

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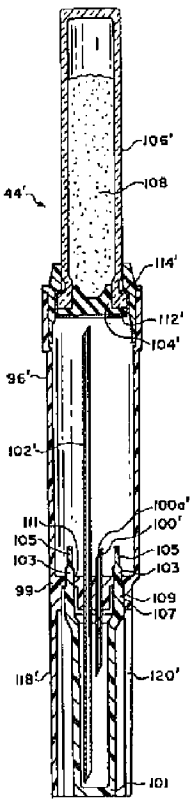

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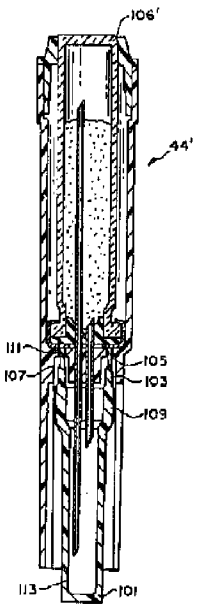

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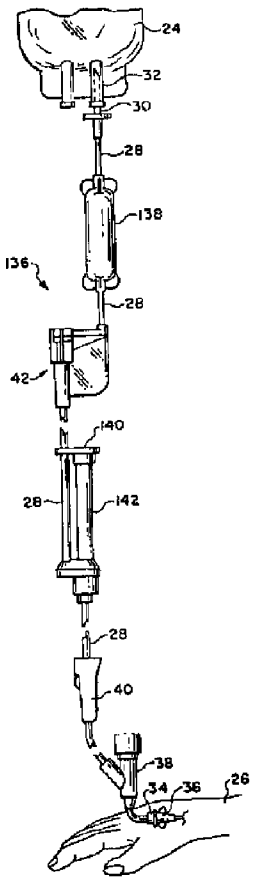

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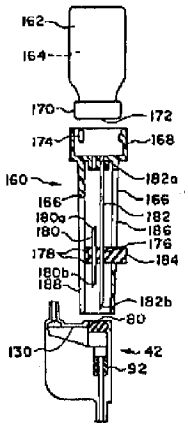

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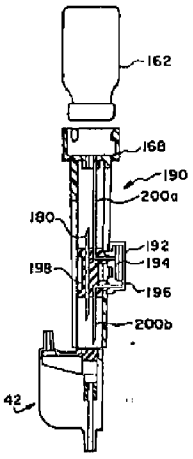

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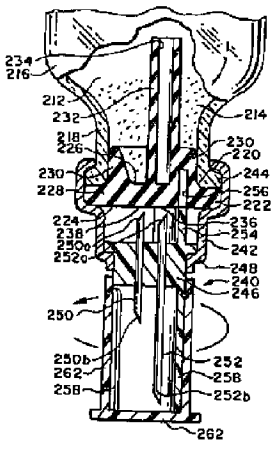

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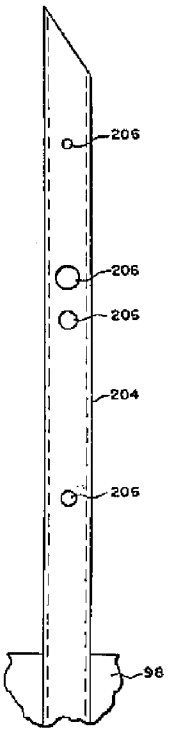

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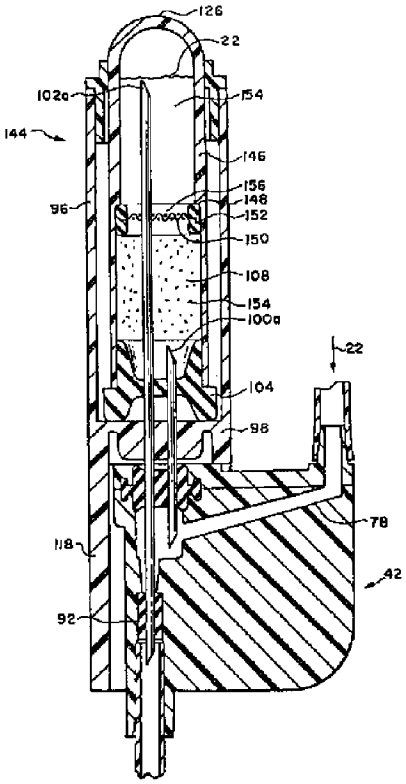

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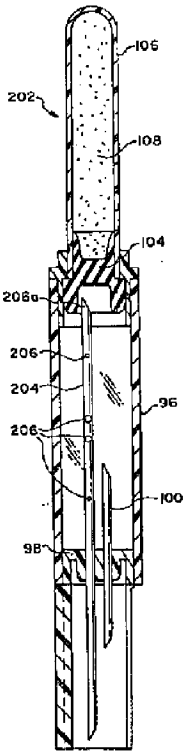

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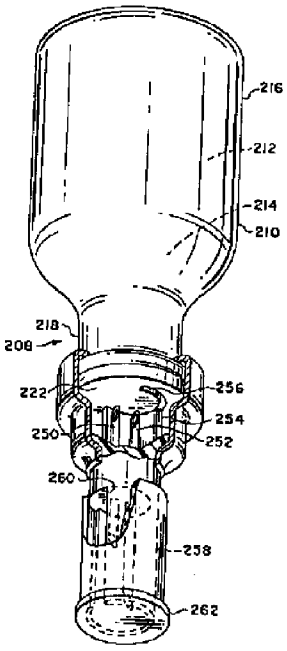

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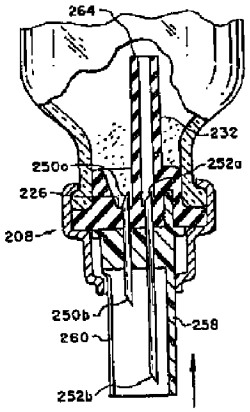

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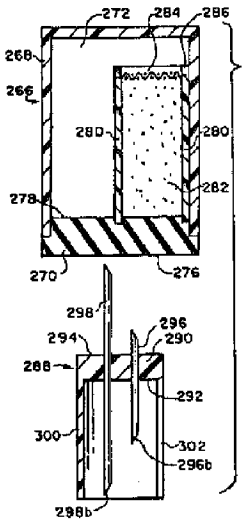

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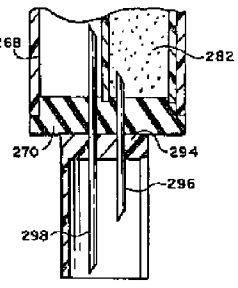

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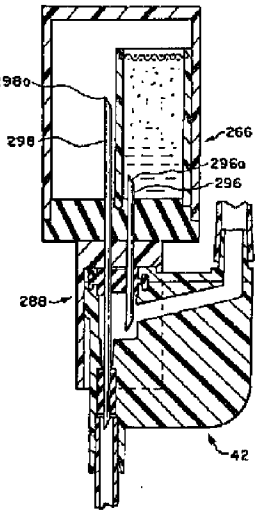

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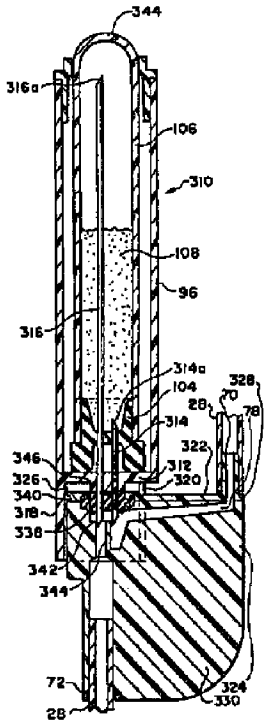

【図２５】